

Problems in Furniture Design and Construction



MADSEN and LUKOWITZ

MAURICE J. HOFFMAN

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Problems in Furniture Design and Construction

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PREFACE

THE authors have combined their efforts to produce a book which will satisfy a long-felt need of industrial-arts teachers for problems or projects suitable for present-day use in our revitalized industrial-arts or manual-training courses.

The material in this book is rich in design and in variety of construction possibilities, and it is not limited to any period of furniture style, for such a limitation obviously would be too narrow for general educational purposes. It is a collection of projects which, it is hoped, will appeal to better tastes, and at the same time serve a broader educational purpose. The crazy-quilt idea has not been used in collecting and developing the projects. No attempt has been made to group them according to grade, although they are arranged in the approximate order of their difficulty. A distinct effort has been made to articulate the design and the construction with a full understanding and consideration of school conditions.

All of the problems have been carried to successful completion in the authors' classes, and many of them have been tried by other teachers under varying conditions. In either case, all that proved successful have been reproduced in the various drawings and suggestions. All of the problems, therefore, are the result of actual performance in regular classwork. The construction details and the suggestions are very pertinent, for they have been prompted by a real appreciation of the problems which constantly come up in this work. Time, equipment, and locality all influence the details of design and construction. For this reason the study of various conditions which might influence the work was made for the express purpose of anticipating these problems before the book went to press.

Each project is represented by a complete working drawing. In many cases, lines which would complicate the drawings without making the construction clearer, have been omitted. Most joints for instance are not drawn, because there is usually more than one way to make them, and their choice, therefore, has been left to the judgment of the person using the drawing. In short, an effort has been made to make the various drawings as complete as is necessary. For clearness they must be supplemented by the text.

The suggestions which accompany the drawings greatly increase the scope and usefulness of the book, for they form a nucleus of new problems, or suggest details of enrichment of surface or contour which possibly would otherwise be overlooked. Many of these suggestions will show other applications and combinations with the result that work of a highly original

character will be produced. The suggestions also illustrate how the projects shown in this book may be varied to meet the limitations imposed by lack of equipment, or by the ability of the boys. It is the sincere hope of the authors that these suggestions with their latent possibilities may increase the scope and usefulness of the book manyfold.

Since the art factor has often been neglected in furniture made in school shops, an analysis of the elements and principles of good design have been discussed in many cases, in detail. It is surprising how a little analysis of this kind results in a power to interpret the finished article in terms of the various elements which contribute to its pleasing appearance. This habit of analysis once formed will ultimately lead to the ability to design articles which have real artistic merit.

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Problems in Furniture Design and Construction

CANDLESTICK

The candlestick seems to be perpetuated for sentimental reasons. It reminds us of the dimly-lighted cabin of our forefathers, the simplicity of whose hand-hewn furniture suggested utility and use, if not beauty.

CONSTRUCTION

The construction of the candlestick illustrated in Figure 1 is shown in Plate 1. The small base, to which the shaft is fastened with a screw, is glued to the larger base. The panels on the shaft are outlined with a marking gauge and chisel. They are then punched with a regular carver's punch, or with one improvised from a cut nail.

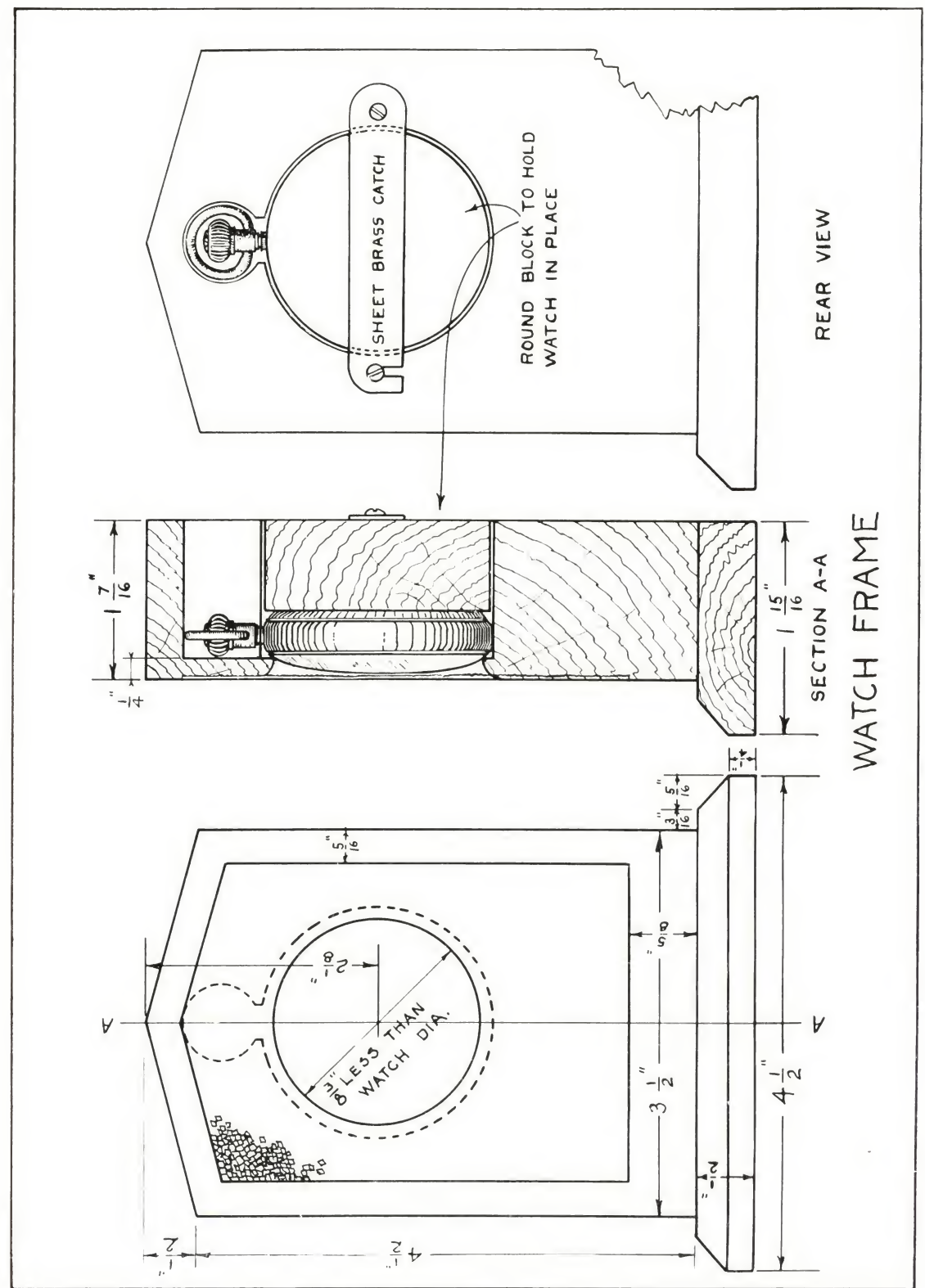
When stained, the punched panel will absorb more stain than the rest of the project because of its pierced and roughened surface, and the result will be a pleasing contrast between the panel and the smooth surfaces.

SUGGESTIONS

The candlestick looks well when it is covered with gesso properly colored. When gessoed, the wood need not be finished smooth, for the gesso will cover all dents and tool marks. A white effect may be produced in the panels by rubbing in a paste consisting of zinc white and furniture wax. Rottenstone and wax used in the same manner produce an antique dusty finish. This candlestick has proved to be an excellent project for the lower grades.



Fig. 1. Candlestick



WATCH FRAME

REAR VIEW

SECTION A-A

WATCH FRAME

The watch frame shown in Figure 2, is a very interesting project, and is exceedingly popular with boys. From the front, the watch looks like a small mantel clock. It looks exceedingly good to the boy, who has succeeded in making it for his own watch. The finishing of this project gives him a sense of achievement which is as good for him as is the contact which he has had with tools and materials.

CONSTRUCTION

The construction of the watch frame is shown on Plate 2. The hole for the watch should be bored from the back first, until the lead screw of the bit just projects through the front. Then the bit should be set for a hole about $\frac{3}{8}$ inch smaller, and the hole should be bored from the front. This forms a shoulder against which the watch may rest, preventing it from falling through the front. It is held from falling backward by the round filler block and the hand-made catch. A hole large enough to house the stem and ring should be bored at the top. This hole must not be bored entirely through; the depth depends on the watch used. The panel is outlined with a marking gauge, and chisel, and is punched with a carver's punch or with one improvised from a cut nail.

SUGGESTIONS

Plate 2 represents this project in its simplest form. The mantel clocks in Figures 20, 21, and 22, and Plates 27, 28, 29, and 30, will undoubtedly suggest variations.

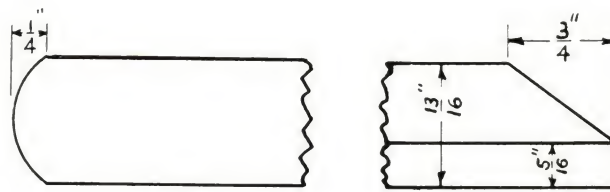
The profile of the panel may be changed and broken into units very effectively.

The base, instead of being chamfered, may have the top edges rounded, and it may be cut out in the center on the bottom with a coping saw, to make it rest on smaller surfaces on the ends. (See base of clock in Fig. 20.)

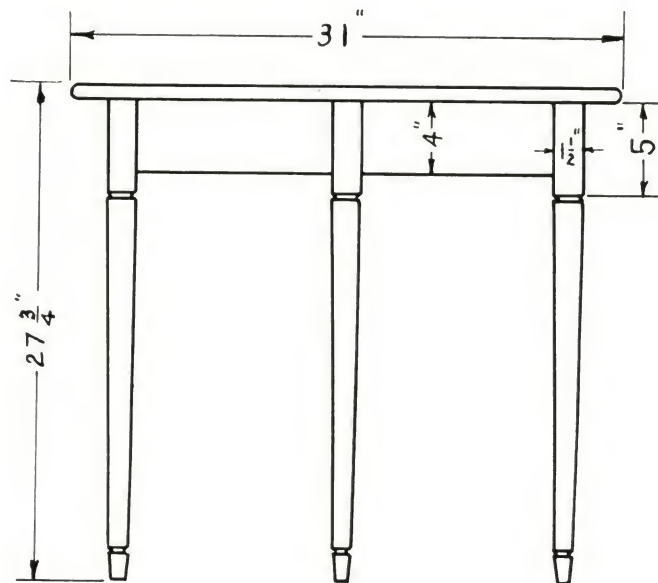
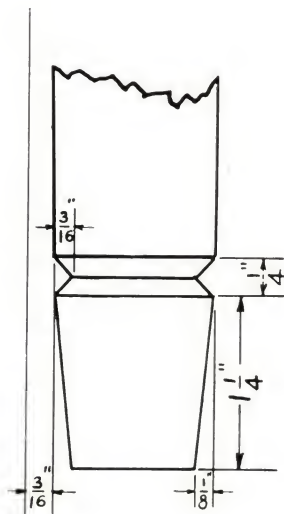
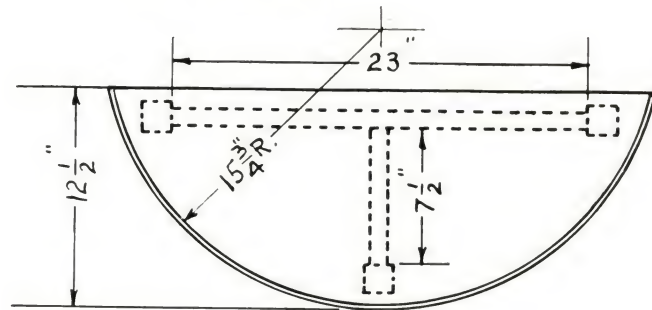
A white effect may be produced in the panel by rubbing in a paste consisting of zinc white and furniture wax. The zinc white may be mixed with rottenstone to produce a light-gray effect, or rottenstone and wax alone may be used to obtain an antique, dusty finish.



Fig. 2. Watch Frame



TOP MOULDS



CONSOLE TABLE

CONSOLE TABLE

For relieving the monotony of wall space and adding dignity to the room, nothing is so effective as a mirror beneath which stands a console table with a pair of candlesticks, or a decorative vase or bowl containing a few flowers. A console set helps to make the home attractive, an attribute which our present-day homes should possess more than ever before.

CONSTRUCTION

The joints in the table shown in Plate 3, may be either mortise-and-tenon, or dowel, the latter being preferable because of their simplicity. The top mould, illustrated at the right top of the plate, is recommended for use on the table, although the one at the left is a little easier to shape by hand. The V cuts near the top of the legs and those near the bottom are easily made with saw and chisel.

SUGGESTIONS

The top of this table may properly be made like that of the table in Figure 3 and Plate 4, or in other shapes. It must, however, be simply treated so that it will harmonize with the rest of the table. The table may be enameled or painted, and suitably decorated; for profile, and primary mass and proportions are such that it can stand enrichment of this kind without appearing overdone.

Gumwood, stained mahogany, or walnut is suggested for this table.



CONSOLE TABLE

This is another console table of the type illustrated on Plate 3. The only difference is the substitution of straight legs and the addition of a stretcher at the bottom. The top of this table is more in keeping with the general design than that of the other table. This project has been successfully used in the grades. The candlesticks which appear on the table are also an early grade problem. See Figure 1, Plate 1, for this candlestick.

CONSTRUCTION

The rails and the stretcher of the table in Figure 3 and Plate 4 may be doweled to the legs. The V cuts on the legs are made easily with saw and chisel. The dentils shown on one side of the drawing, under the top, can be made by sawing shallow saw kerfs into strips of the proper size. Either a backsaw or a circular saw may be used. These strips may be fastened in place with screws or brads, if desired.

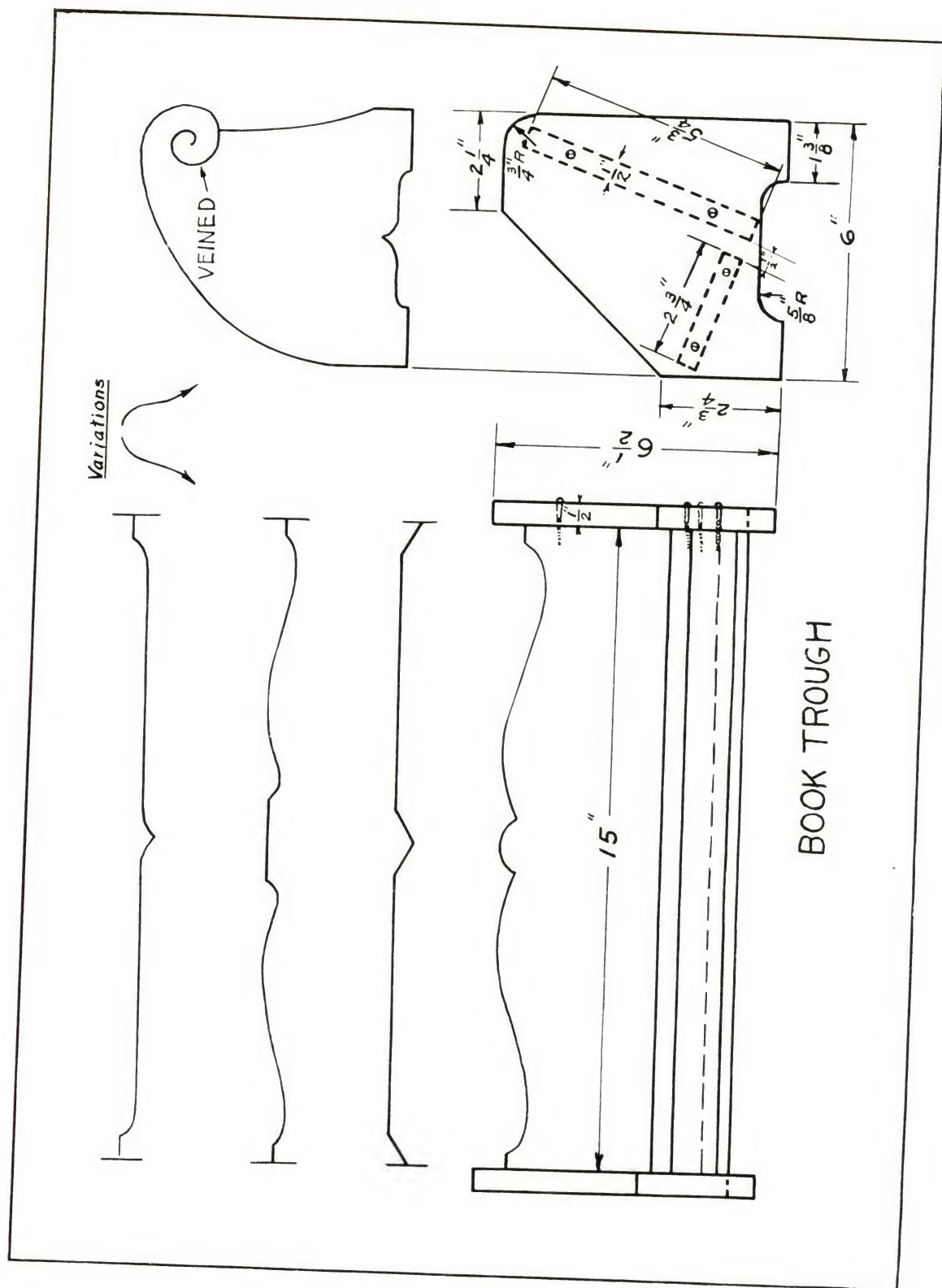
SUGGESTIONS

The dentils under the top may be omitted, as shown on the right side of the table on the drawing, but they add much to the appearance and accentuate the interesting shape of the top.

In place of the dentils, an apron as wide as the rear rail may be mitered all around under the top. A $\frac{1}{4}$ -inch groove about $\frac{1}{8}$ inch deep, cut in the apron about $\frac{3}{8}$ inch up from the lower edge, would be very appropriate as an enrichment of the apron. It would be entirely in keeping with the angular design of the table. Even with such an apron the dentils may be used, but they should not be more than 1 inch long when used in this way. Cut the dentils in a thin strip about $\frac{1}{8}$ inch thick, and apply them right on the apron. See the dentils on the door of the radio desk, Figure 38 and Plate 51; also the mouldings in Figure 49 for suggestions of different designs of dentils.



Fig. 3. Console Table



BOOK TROUGH

The book trough shown on Plate 5 is a distinctive departure from the time-honored type so frequently found in school shops. It requires a little different type of construction, and it is within the ability of the early junior-high-school boy. The simple variations shown on the drawing suggest the flexibility of this project from the design standpoint.

CONSTRUCTION

Almost any wood can be used in the construction of this book trough. Since no large pieces are required, it is possible to utilize odds and ends. The drawing calls for the use of screws in the assembly, but brads will serve very well instead of screws. Care must be taken in the assembly, or the book trough will rock when finished.

SUGGESTIONS

A jig, in which to hold the trough in its relative position while assembling, will simplify this operation and prevent the rocking referred to above. Nailing or gluing the pieces which form the trough, before the ends are fastened, will decrease the difficulty which might be encountered in assembling. If the trough is made for books above the average size, it must be made wider, otherwise the books may have a tendency to tip out. Of course, a larger trough requires larger ends, but these are easily enlarged from the suggestions given on the drawing.

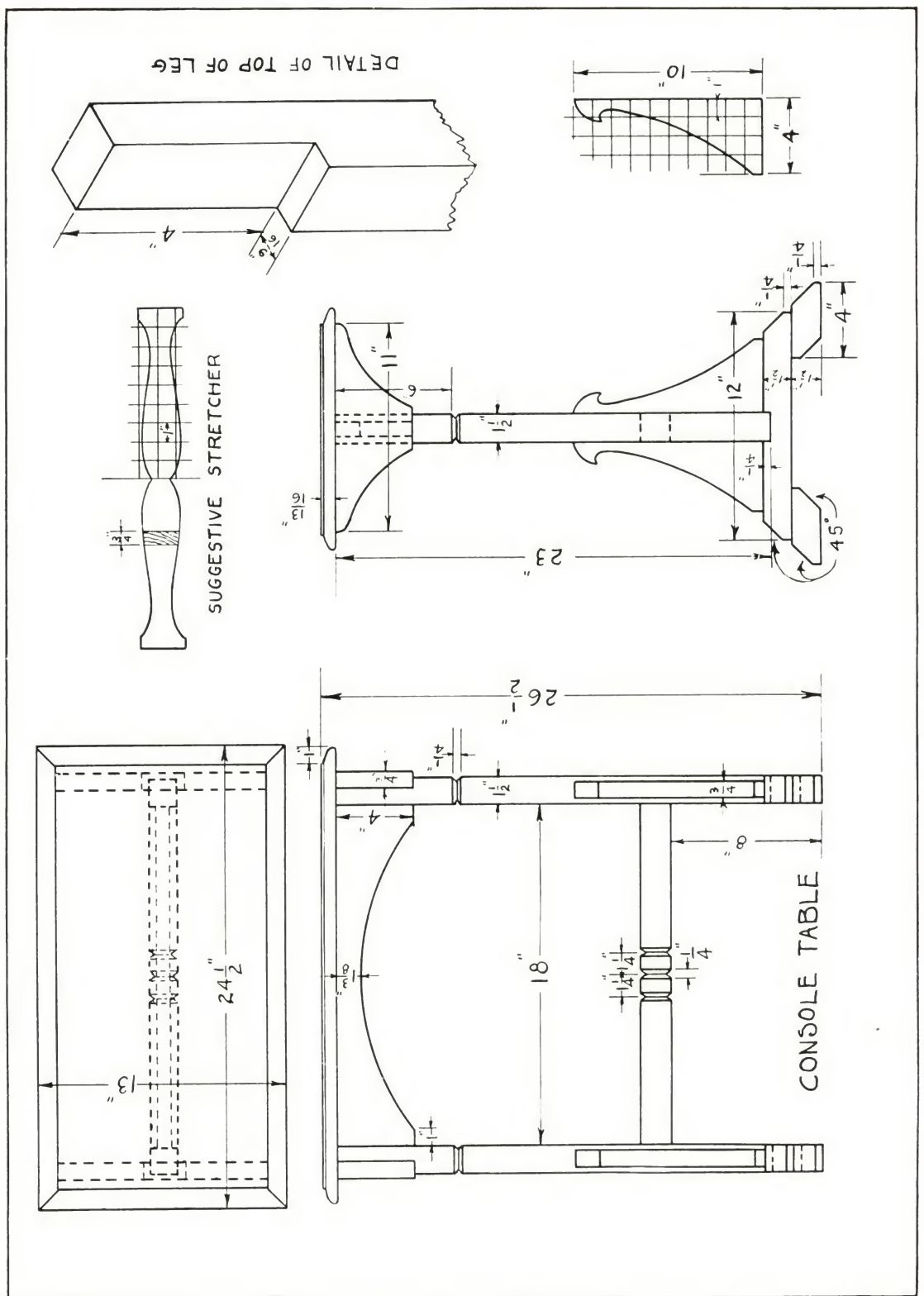


Plate 6

CONSOLE TABLE

The console table shown in Figure 4 is of rather unusual design and construction. It, too, was designed so as to be within the ability of the early junior-high-school boy. It also serves as a fine end table; a convenient place for a radio set, which may then be drawn up alongside of one's favorite chair.

CONSTRUCTION

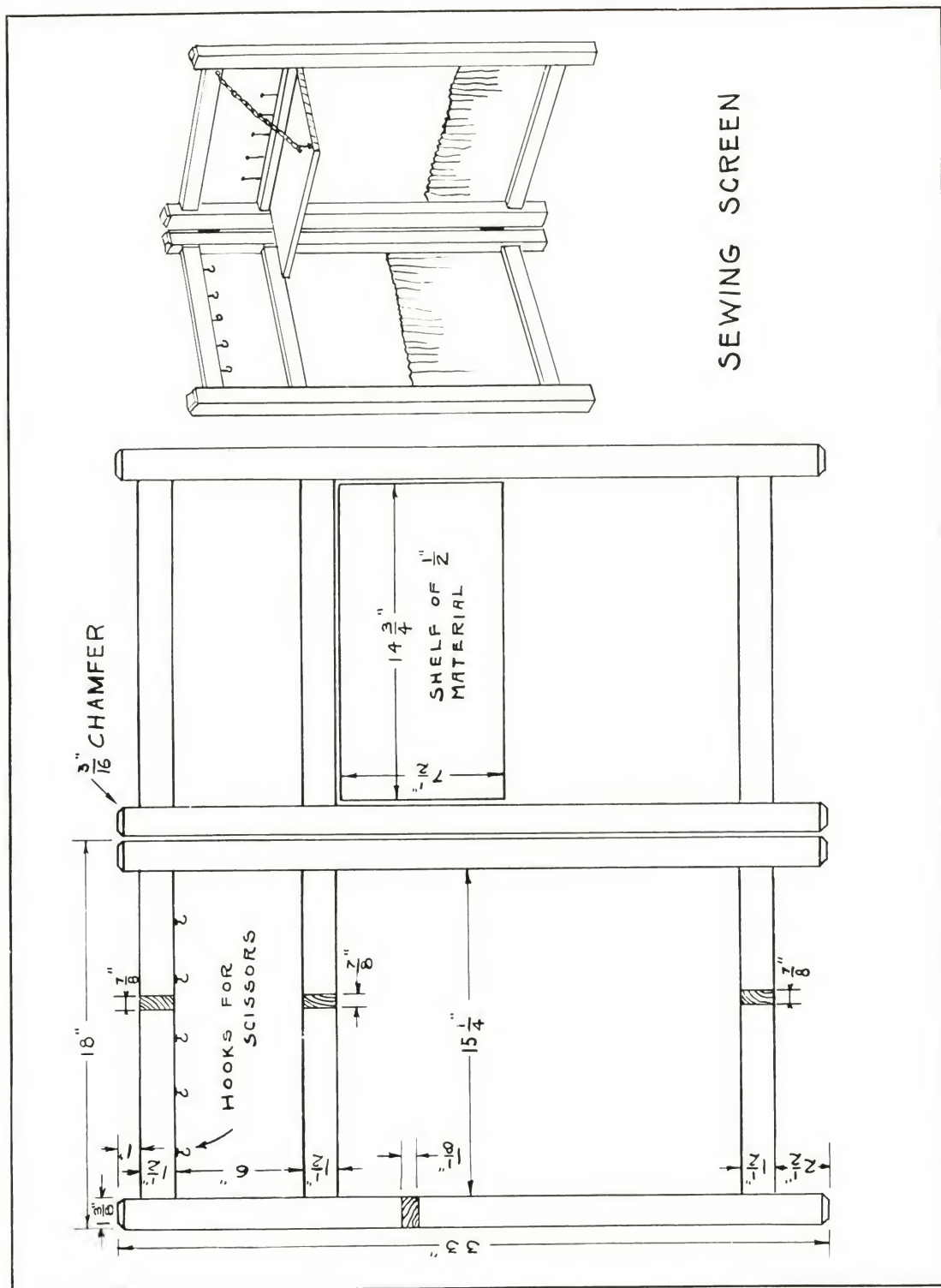
The construction of the table in Figure 4 is clearly shown in the drawing, Plate 6. Doweled butt joints are very satisfactory here, although other methods of joining may be used. The brackets at the bottom may be glued and bradded in place. The blocks at the bottom are cut at an angle of 45 degrees. This angle not only looks well, but the blocks can be cut in an ordinary miter box. The table has been made and assembled entirely with screws and brads, with satisfactory results. See Figure 48 for a method of moulding the top.

SUGGESTIONS

Attention is called to the V cuts near the top and to those in the stretcher on the drawing. If these cuts are omitted, an essential part of the design is lacking, and the result will be unsatisfactory. This is here mentioned in order that the importance of such little details may be fully appreciated.



Fig. 4. Console Table



SEWING SCREEN

The sewing screen, shown in Figure 5 and Plate 7, is a handy piece of furniture. It can be carried about very easily, and takes up little room when not in use. Unlike the sewing cabinet, it can be folded together and tucked in behind a door or some piece of furniture when not in use.

CONSTRUCTION

Either hardwood or softwood may be used for the frames. Dowel all rails, using two dowels to each joint. After finishing, hinge the frames and shelf, attach the chain, cup hooks, and escutcheon pins. Cretonne serves very well for the pockets and the outside of the frames. The two pockets are tacked to the outside of the frames and the cretonne is then tacked on over the pockets. Gimp is tacked on all around to finish the edge.



Fig. 5. Sewing Screen

SUGGESTIONS

A hook or clasp may be used to hold the frames together when closed, and a handle may be attached to the top if desired. The frames may, of course, be painted or enameled, and then possibly stenciled. A little stenciled enrichment in the center of the rails, or a right-angled design applied at the corners, or possibly a little tapering design at the top of the legs, would be very effective.

Leave off the shelf, hooks, and cretonne; cover the frames with wall board, and finish with a little moulding, or set the wall board into grooves in the frames, and the sewing screen has been changed into a serviceable fire screen.

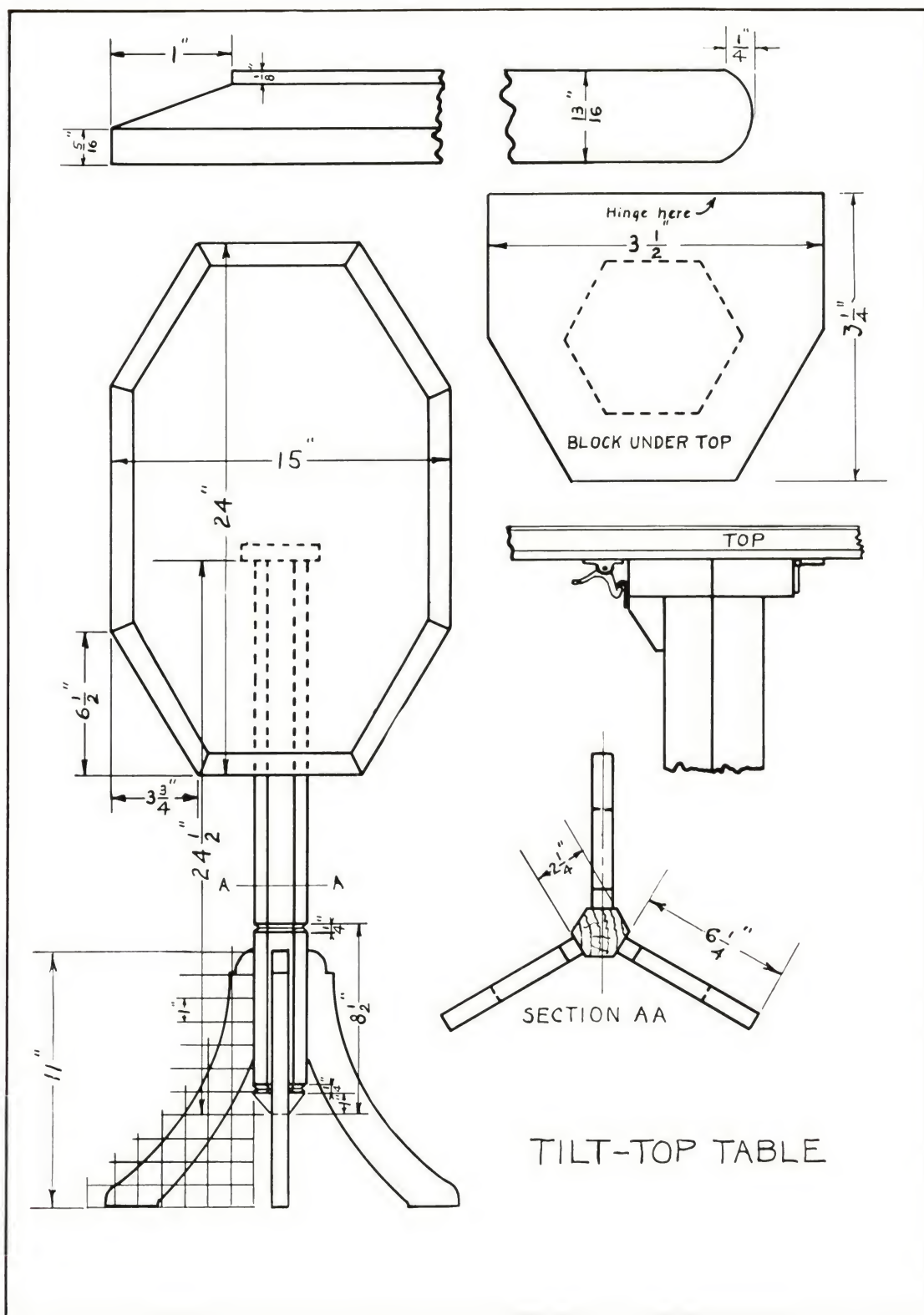


Plate 8

[Twenty-two]

TILT-TOP TABLE

Of the three tilt-top tables in this book, the one shown in Figure 6 and Plate 8 is the most simple to construct. Here, again, simplicity does not mean homeliness. The simple lines and good proportions of this table make it an excellent project.

CONSTRUCTION

The table makes up very well in gumwood, and can be made by boys of early junior-high-school age, even though no machinery is available. The V cuts at the lower part of the leg can be easily made with saw and chisel. Attention is called to the method used in fastening the top. A hinge is the

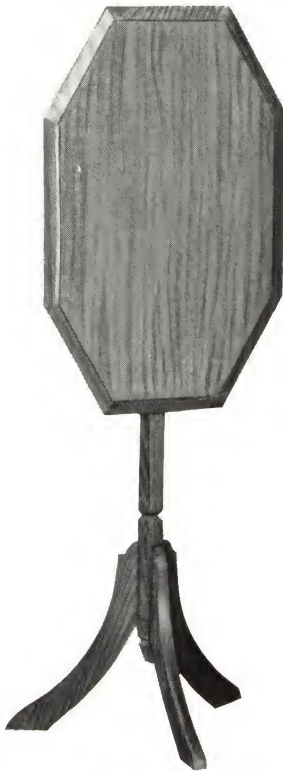


Fig. 6. Tilt-Top Table



Fig. 7. Tilt-Top Table

pivot on which the top swings, and an elbow catch holds the top in a horizon position. A long, narrow hinge is best for this purpose because it prevents side play. No difficulty whatever will be experienced by beginners with this method of fastening the top, and it is much more simple and just as practical as one of the commercial methods shown on Plate 55.

SUGGESTIONS

Figure 7, an illustration of the same table with an elliptical top, shows a possibility of variation in design. Two-tone or encised surface enrichment

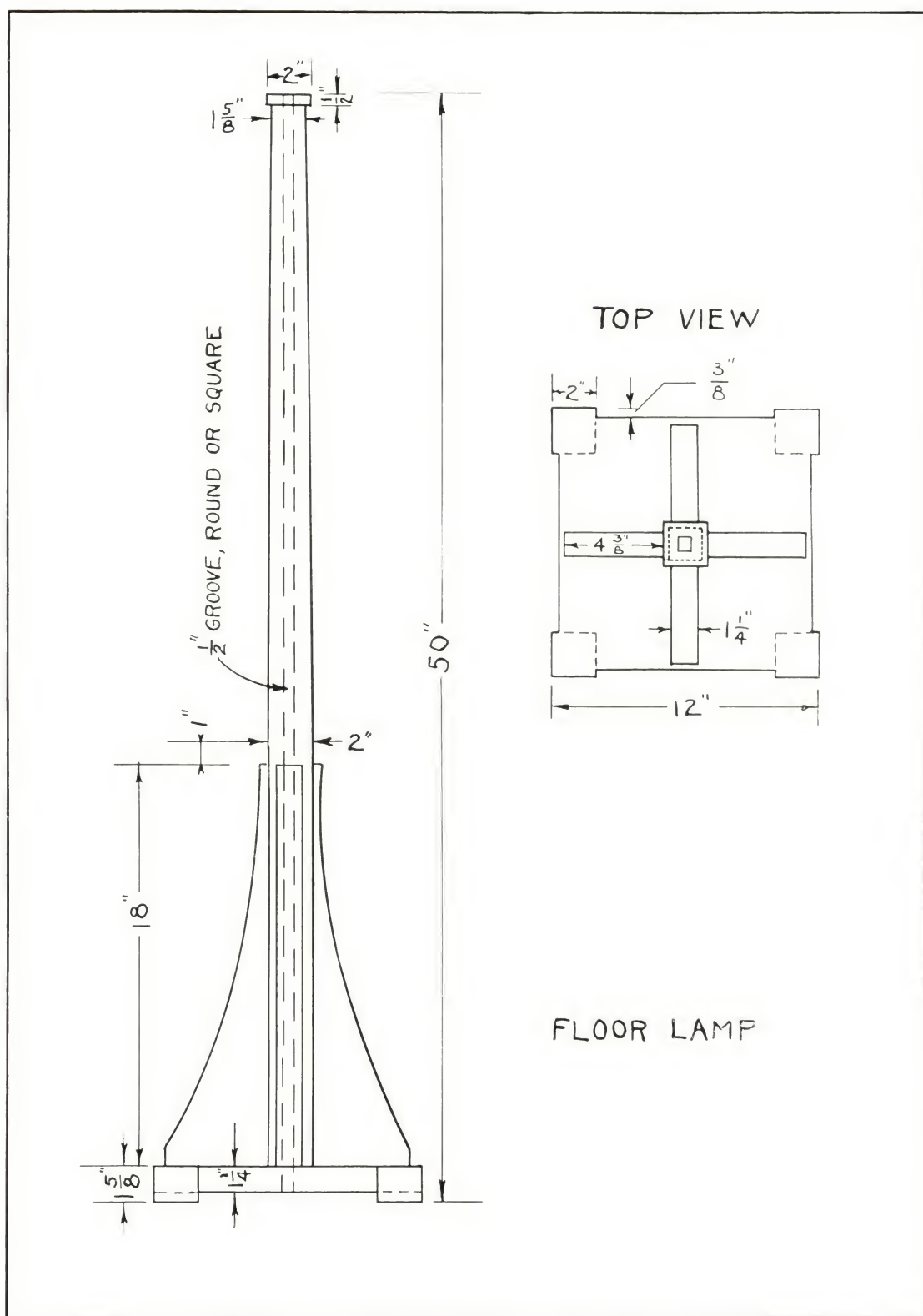


Plate 9

[Twenty-four]

such as simple veining may be used, if desired, but the profile and surface of this table is such that it looks well without further attempt at decoration. In short, it is emphatically conservative from the design standpoint, and must be treated accordingly.

This table, however, may be effectively enameled or painted, and then decorated simply in color.

FLOOR LAMP

Not so very long ago, when the problem of lighting was attended with the messy annoyance of dripping candles and smoke and wick trimming, it is no wonder that the folks went to bed at dusk, or soon after, and rose at sunrise. Light has always been associated with beauty and life, and it is therefore easy to see that modern methods of lighting have been instrumental in tremendously increasing the use of various kinds of lamps to beautify the

home with their lights and colors. The floor lamp shown in Figure 8, savors of the mission or craftsman style. Its lines and proportions are not what the drawing on Plate 9 might suggest. A glance at the accompanying illustration, however, will redeem the lamp. Such furniture, no matter whether classed as mission or craftsman, has its place when judiciously and consistently used.

CONSTRUCTION

This lamp may be made in various ways depending upon the ability of the student and the time available for its construction. The standard may be made of two pieces glued together. Don't forget the groove for the wire. The base may be made of one piece. But, in order to do away with the end grain, the base may be made of four pieces mitered, doweled, and glued, after which the four sides may be cut as shown on the drawing. Blocks are then glued to the bottom of the base to form the feet.

The standard is mortised into the base; the brackets are then glued to the base and standard.

SUGGESTIONS

This lamp may be made in school shops

[*Twenty-five*]



Fig. 8. Floor Lamp

without lathe equipment. It may be made of any of the hardwoods and finished to harmonize with the furniture in the home. This design may be used as a suggestion for small table lamps and candlesticks.

The light fixture may be fastened to the top of the column by screwing a pipe nipple into the end of the standard. Most of the lamp-socket fixtures of this type are provided with a flange, which is threaded for the nipple and drilled for wood screws for fastening to the top of the lamp. If this type is used, it is well to bore pilot holes for the screws in the 2-inch block at the top of the lamp, to prevent it from being split by the flange screws.

BEDROOM TABLE

To some it may appear that this is an age of tables, so many and varied are the tables found in the modern home. Yet, history reminds us that our forefathers were wont to publish their names together with information as to the cost and the number of tables which they owned. Utility and beauty rather than pride of ownership are the reasons for finding so many tables in our homes today. The table, shown in Figure 9 and Plate 10, serves well as a bedside table, telephone table, lamp stand, or for any other use which suggests itself. This table with its simplicity and good proportion is a fine example of good design.



Fig. 9. Bedroom Table

CONSTRUCTION

Mortise-and-tenon, or dowel joints may be used for fastening the rails to the legs. The shelf may be let into the legs, or it may be doweled and glued to them. Any suitable method of drawer construction may be used.

SUGGESTIONS

Walnut, mahogany, or gumwood is suggested for this table. It may be stained or enameled to match other furniture in the home. This table is similar to the one shown in Figure 32 and Plate 45. It should prove a popular problem in the shop not equipped with a turning-lathe.

Some interesting suggestions for fastening the shelf to the legs are indicated by the drawing on Plate 10.

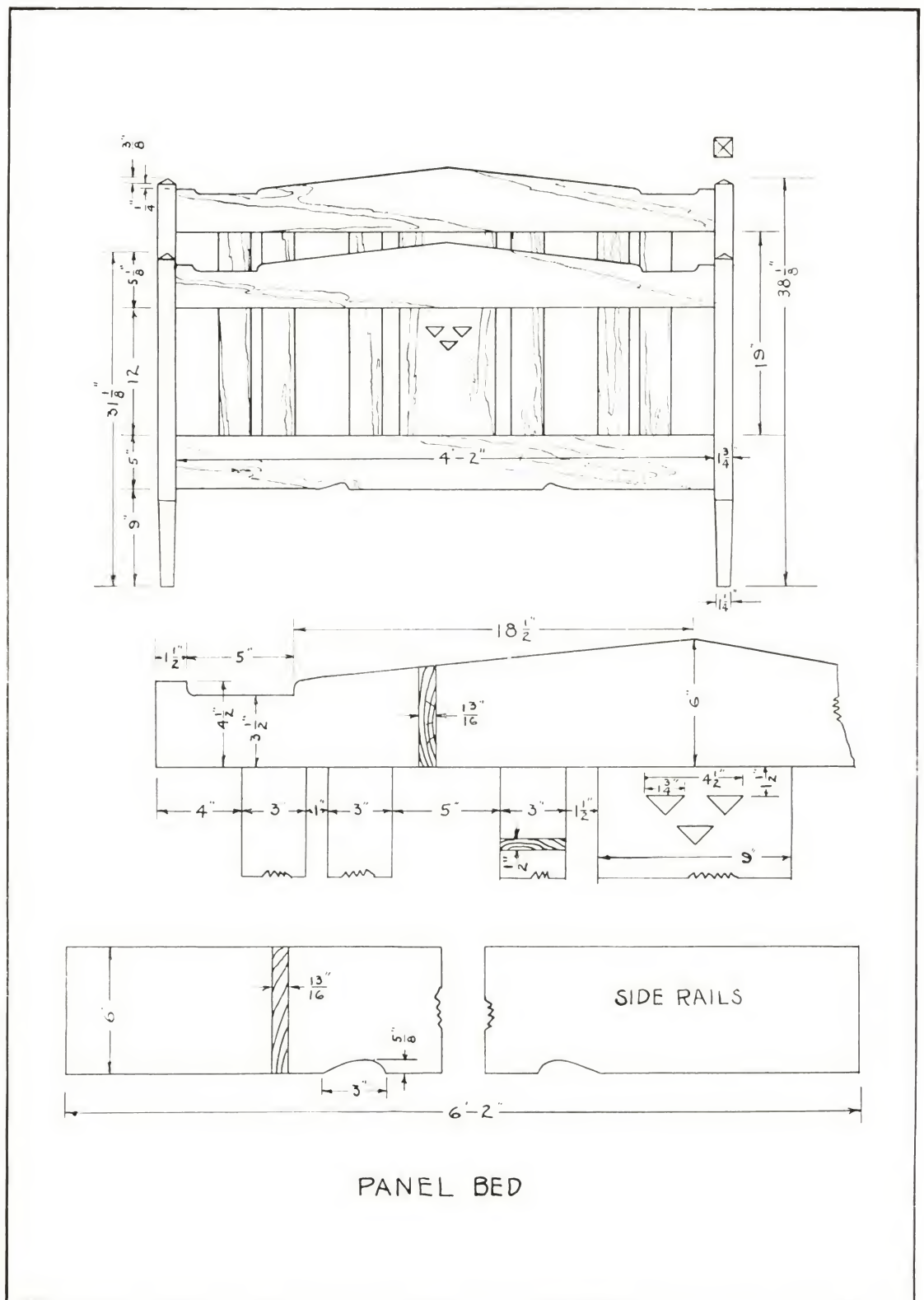


Plate 11

[Twenty-eight]

PANEL BED

The bedstead "iron age" seems to have passed, and though the bedstead shown in Figure 10 and Plate 11 is not the last word in wooden bedstead design, it is within the range of the average school shop, and is neat and conservative in appearance. Bent plywood bedsteads are out of the range of



Fig. 10. Panel Bed

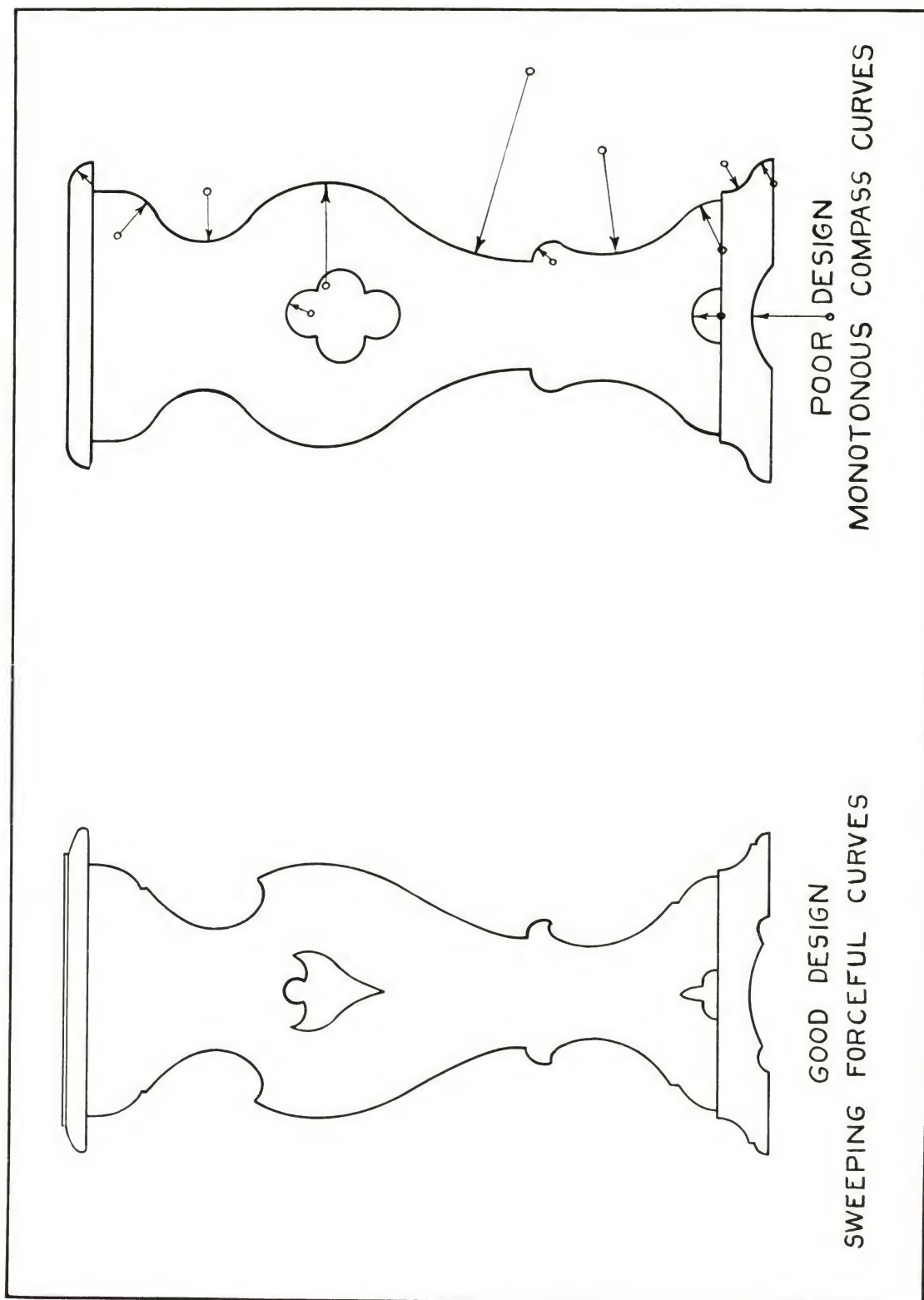
schoolwork, for they require the making of specially shaped cauls which take too much time and material to construct, unless the work is organized on a production or quantity basis. Experience in building cauls can be gained on smaller projects which do not require so much time and material to construct.

CONSTRUCTION

The main joints in bedstead construction must be very strong, so care should be taken to get well-fitting and well-glued joints. The panels may be set in grooves. The rails should be fastened to the ends of the bed with any of the bed-rail attachments on the market. This construction really has no difficult features, and the project should cause no trouble under average conditions.

SUGGESTIONS

This bed can be given a modern appearance by using a large, one-piece plywood panel instead of the small panels. A matched figured panel may be used, or, if desired, any cheap panel may be used, and the bed may be enameled and decorated in any of the light shades so often used on bedroom furniture.



A STUDY IN DESIGN: GOOD, AND BAD

The two designs for an end table, on Plate 12, while they have much in common from the standpoint of general contour, are vastly different in detail of line. One is organized and definitely defined, while the other is a motley collection of loops and monotonous compass curves of assorted sizes. Even a person unskilled in design, would pick out the latter as the least desirable of the two. His eye would tell him that the other was far more pleasing and restful with its graceful, sweeping curves, relieved now and then by a shoulder or bead wherever an important change of direction occurs. As a general rule, whenever a change of direction occurs in a line, the change is separated or marked by a bead, a shoulder, or an internal or external loop, except where the change of direction is very marked; then the junction of the two lines themselves often form a pleasing and restful connection. An illustration is the junction of the two lines just above the center of the design.

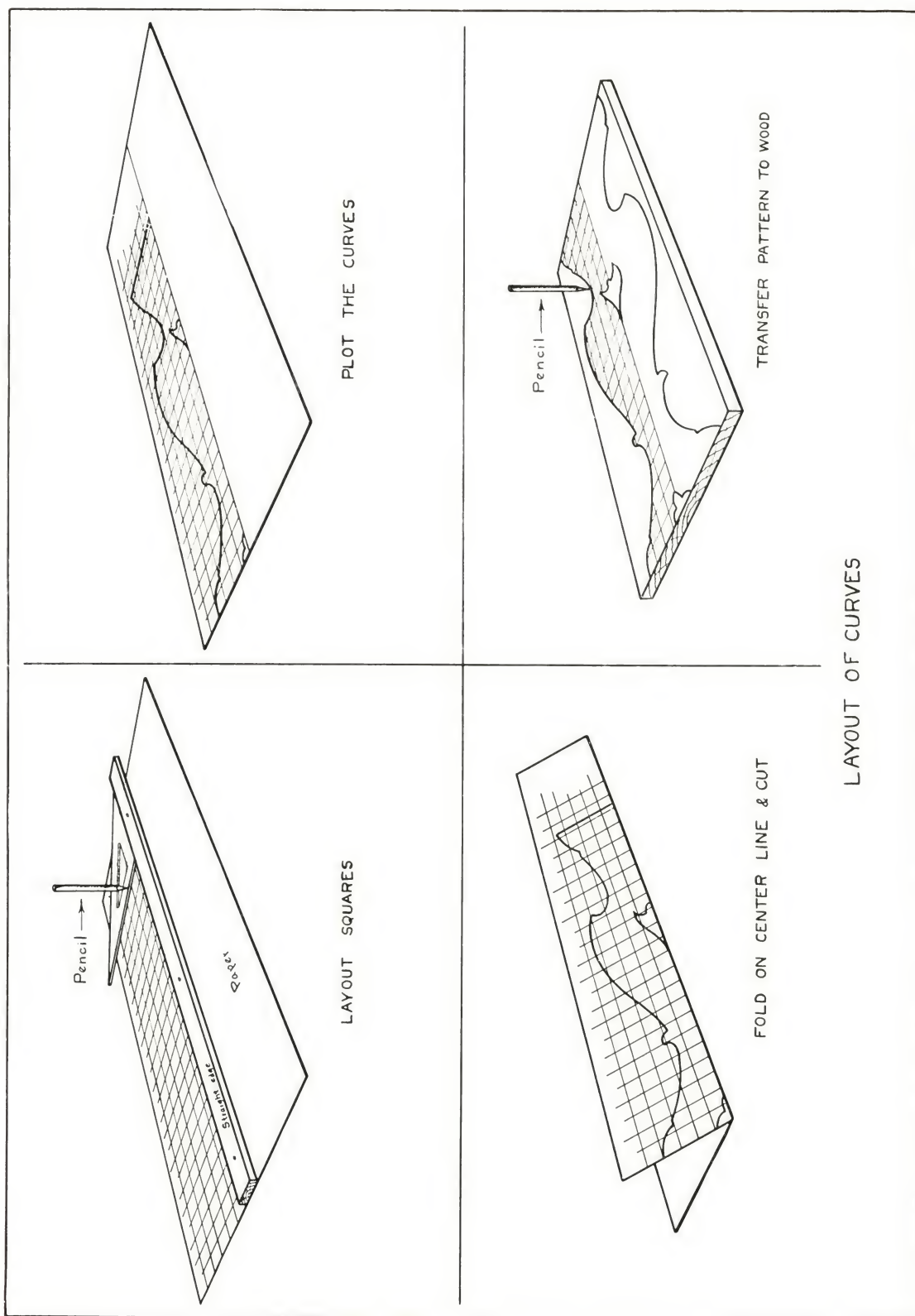
In a compound curve, such as the profile of the outer edge near the center, one part of the compound curve should be dominant, that is, its sweep should be larger than that of the other. The term "sweep," rather than radius, is advisedly used in this design terminology. Radii in the hands of the beginning student of design are dangerous. Witness the result in the design at the right.

It is not to be inferred, however, that a radius, or radii, cannot be properly used in good design. There are instances where they contribute to the effect. However, the beginner in designing should not be allowed to use the compass because he will surely use it indiscriminately, and consequently his work is likely to abound in clumsy or monotonous compass curves.

The design at the right has not been exaggerated; it is just a sample of a perverted attempt at originality. From a standpoint of beauty, it is a monstrosity.

The one at the left has not been overdone for the purpose of showing up the other. Its design follows the general line of the other, and shows graphically the connection between the two. In short, cross reference between the various parts is made easy.

It is suggested that, in reproducing the various designs in this book, the foregoing remarks on design be borne in mind because the temptation to use the compass to closely approximate some of the curves may be very great. It is sometimes quite difficult to reproduce these designs full size from so small a copy unless the principles of design are known and followed. As a last resort, try the design on the eye; if it pleases, it is usually good, if it does not, it is not good. Of course, this requires an open and unbiased mind and



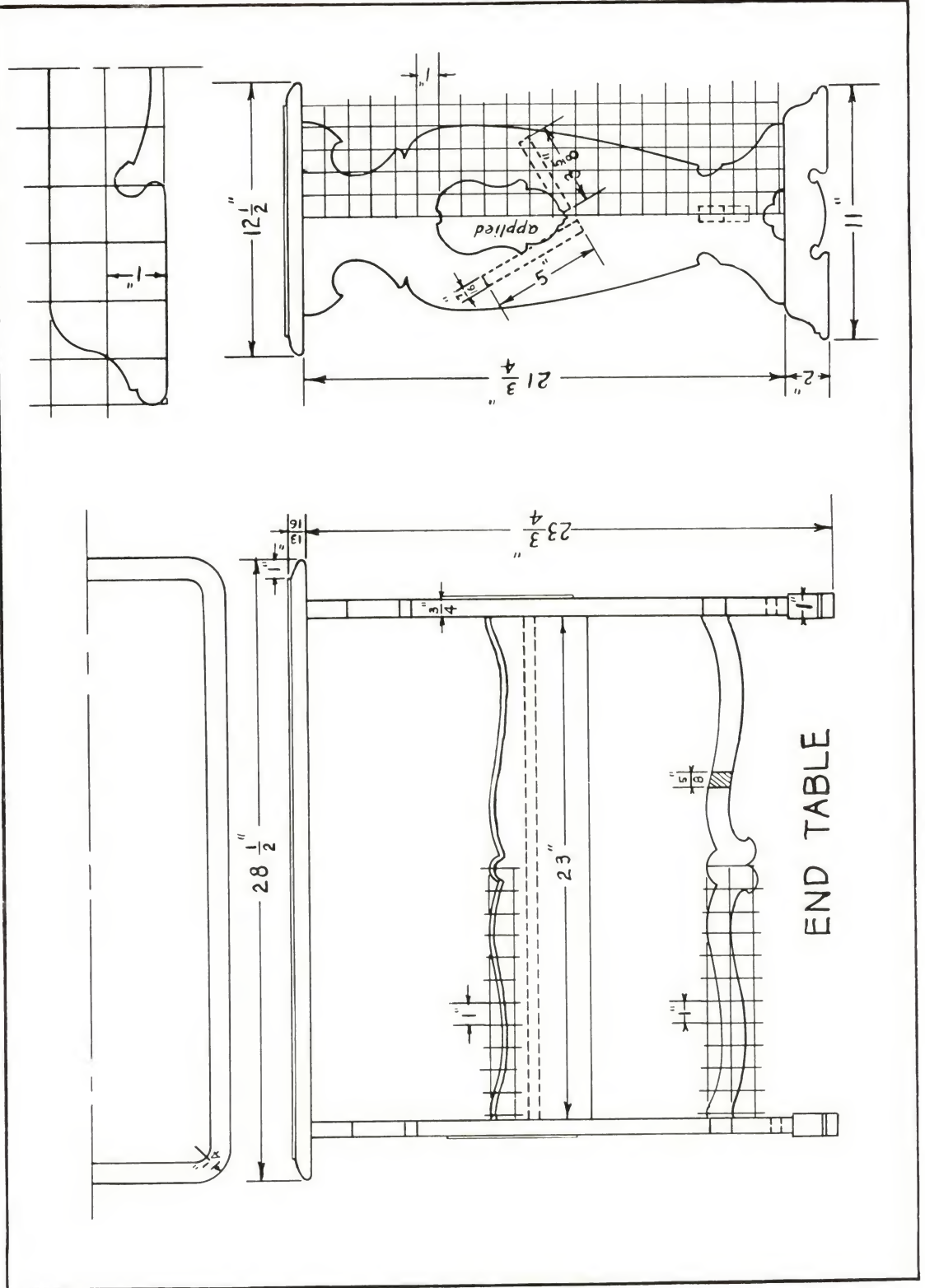
some latent ability. Trying a design on the eye may seem like a crude way of selection, but it is in fact the real test for beauty, providing the eye has been schooled in the appreciation of the harmony of line and is susceptible to the gracefulness that results from proper balance. Studying any good designs and analyzing them, and then in turn forming new combinations from them, will surely develop that power of nice discrimination which is necessary to truly appreciate if not to create objects of real beauty.

REPRODUCTION OF SQUARED DESIGNS— LAYOUT OF CURVES

For faithful reproduction of squared designs, the method illustrated on Plate 13 is recommended. The curves must be carefully plotted, because all errors will be magnified in the reproduction, usually resulting in an unsatisfactory design. In some cases, the details are such that a variation, although slight, will spoil the whole effect. For small details, $\frac{1}{4}$ inch, or even less variation, will spoil the design.

In the preparation of many of these drawings, which meant reducing them from full size to plate size, the same difficulty was encountered, and some distortions inadvertently may have been made. Since plotting the curves in this manner is the best method available under book conditions, the user is requested to exercise care in the reproduction, and then if the design is not pleasing, to check it by the "try-it-on-the-eye" method before referred to.

Carefully determine the following points when reproducing a design by the square method. Determine the exact position of all extremes, such as strategic or important "narrows" and "wides," and then carefully sketch in the various curves, paying close attention to their junctions or terminals, as the case may be. Read suggestions on Page 31. Half of symmetrical design may be made and traced on both sides of a center line on the wood, but it is advisable to complete the whole design on paper, for it is then more easily judged and corrected. In reproducing most of the table stretchers, the paper must be folded twice before being cut, so as to repeat the line four times. With a little inherent ability and a knowledge of the principles of good proportion and form, this rather slow method of reproduction can be dispensed with. The finished full-size sketch can then be made by using the drawing merely as the inspiration or idea. However, by faithfully following the above suggestions and analyzing the results, one cannot help but develop his powers of creation and appreciation. The inability to sense or recognize the good in a design precludes the acquiring of any ability in original design.



END TABLE

Every home has room and use for an end table, and the truth of this statement is evidenced by the great popularity of this project. There is no limit



Fig. 11. End Table

to the designs that may be evolved for end tables, and the five contained in this book, Figures 11, 12, and 13, and Plates 14 to 18 inclusive, while complete in themselves, will no doubt suggest others.



Fig. 12. End Table

CONSTRUCTION

Walnut, mahogany, gumwood, or birch may be used for any of these end tables. The joints should preferably be mortise-and-tenon. Butt joints

[Thirty-five]

may, however, be made with flat-head screws counterbored and plugged. This latter form of construction is advisable where ability or equipment is lacking to make mortise-and-tenon joints.

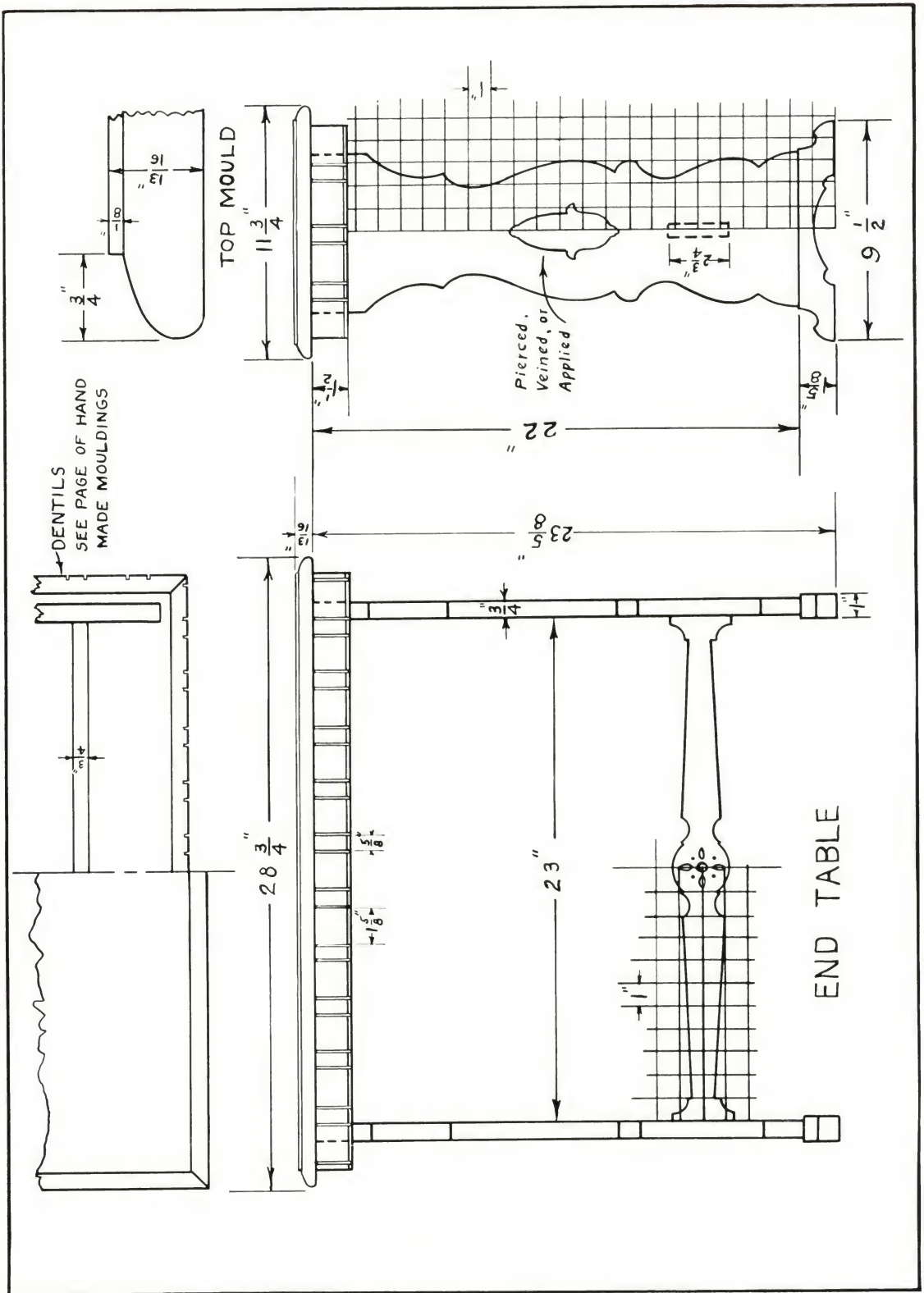


Fig. 13. End Table

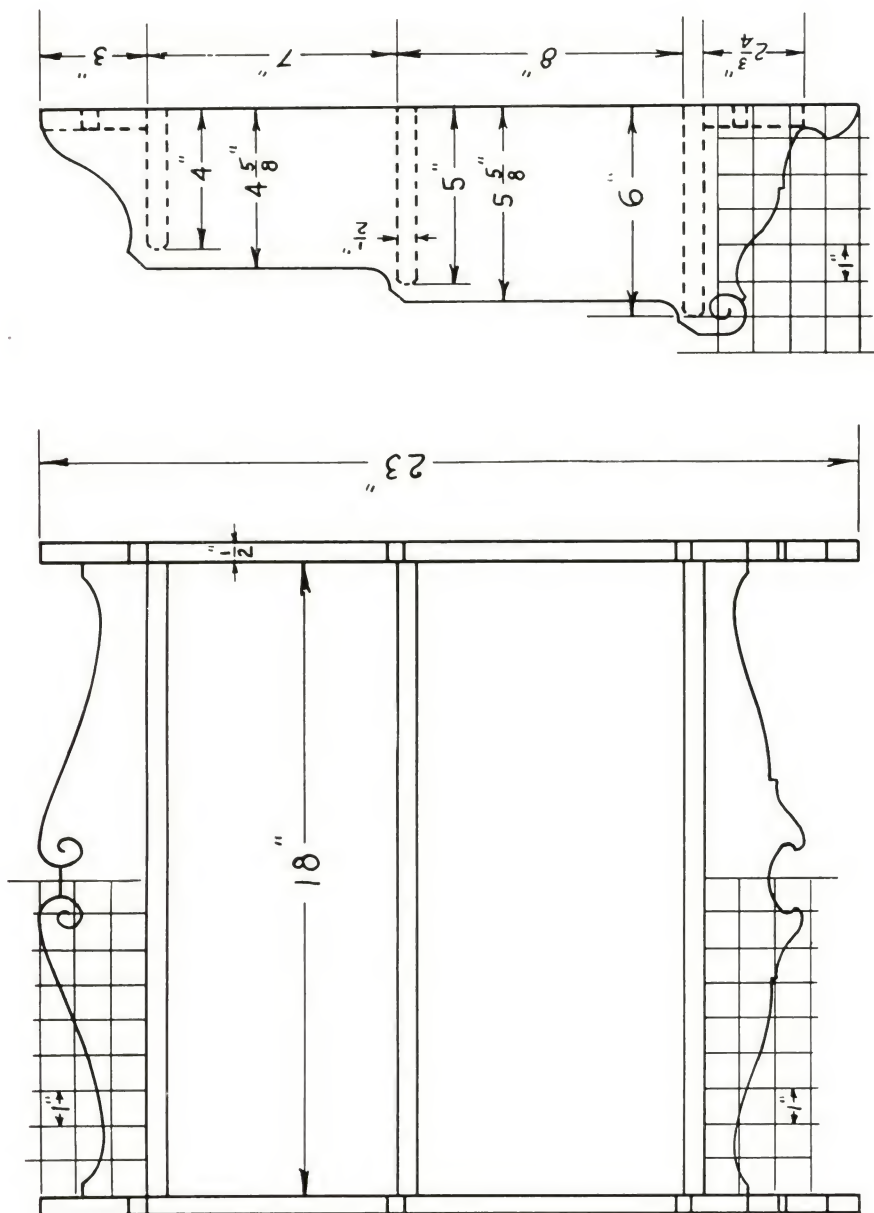
The trough for books will cause trouble unless it is very accurately laid out and cut. It is suggested that a shelf be substituted, or that both trough and shelf be left out and merely a stretcher used on top and bottom, as in the ones on Plates 15 and 16. The top stretcher is not always visible, and an arched piece similar to that used on the stool on Plate 25 could be used.

SUGGESTIONS

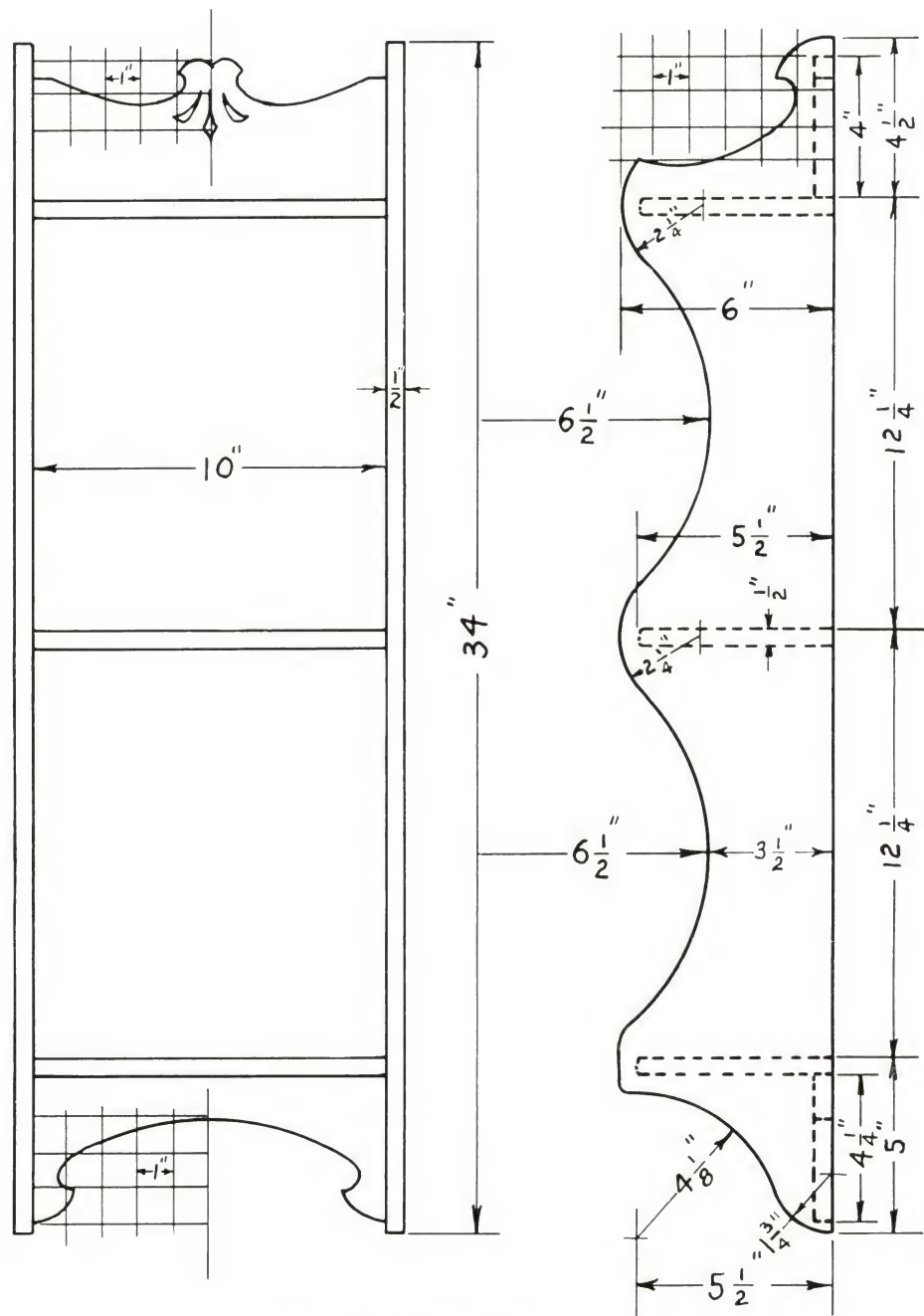
These tables have wonderful possibilities for surface enrichment. The top moulds may be contrasted with the top by making them lighter in color. When this is done, too great a contrast should be avoided. In staining applied or veined portions, sharp contrasts should be avoided, and an effort should be made to produce harmonious contrasts. Any number of good designs may be developed for enrichment of the ends either by veined, pierced, or applied work. Besides those used on the drawings of these tables, Plates 61, 62, and 63 will no doubt suggest other suitable designs.



[Thirty-eight]



WALL SHELF



WALL SHELF

WALL SHELF

A wall shelf or a what-not (a corner shelf) will find place in nearly every home. It serves as a place to exhibit bric-a-brac and possibly a few light books. It, too, like a picture or a mirror, breaks the monotony of blank walls.

CONSTRUCTION

The construction of the wall shelves in Figures 14 and 15, and Plates 19 to 22 inclusive is quite simple. Nailed butt joints will serve for enameled or



Fig. 14. Wall Shelf



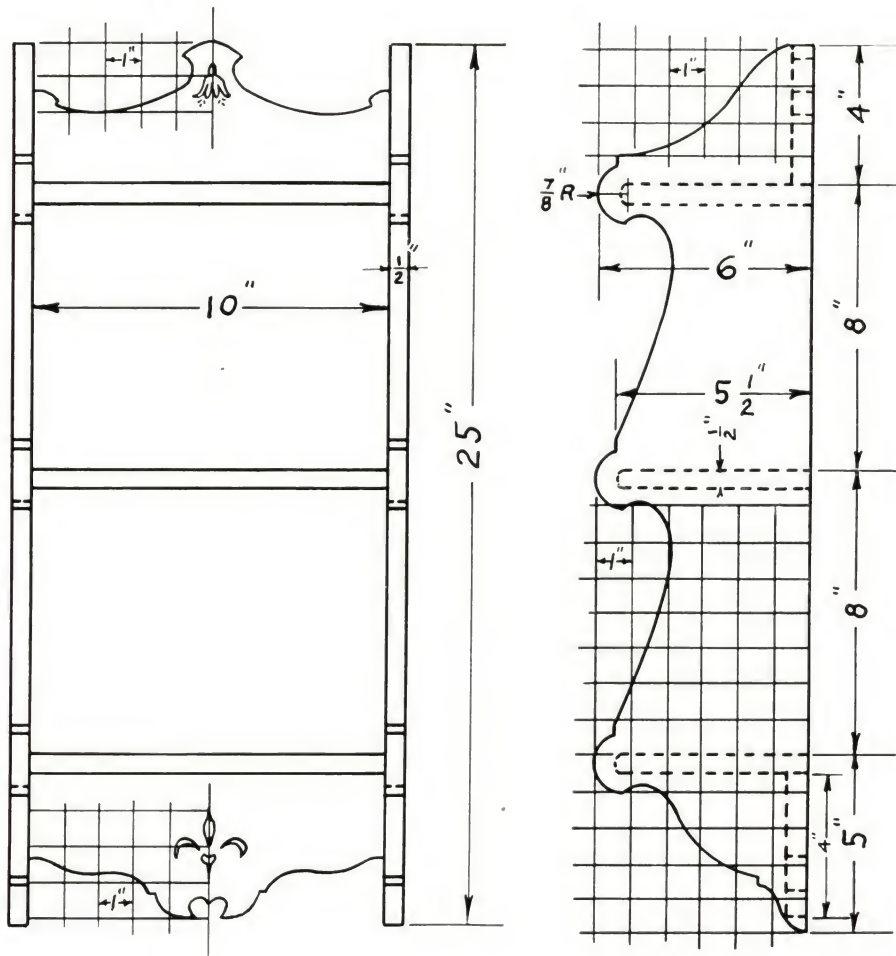
Fig. 15. Wall Shelf

painted shelves, while glued dado joints will make a nicely-finished job for stained and varnished work. Of course, the stained shelves also may be nailed and the nail holes puttied up neatly with colored putty.

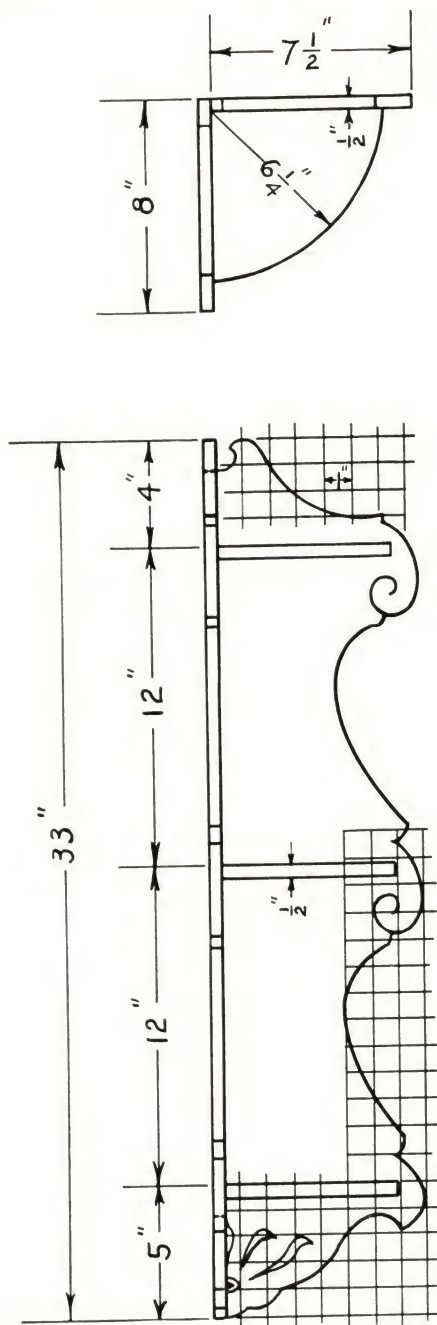
The back of the wall shelves, the pieces at the top and bottom, are often omitted, but they give rigidity to the structure and add to the appearance.

SUGGESTIONS

One shelf may be omitted from these three-shelf units, but the ends should be shortened to correspond. This is easily done because the design is repeated for each shelf. Cut-outs may be used to enrich the ends, or they may be decorated with floral designs, conventional or otherwise. When tastefully finished, they are an asset to the furnishing of our homes.



WALL SHELF



CORNER SHELF

FERNERY

The fernery shown in Figure 16 and Plate 23 is another example of what can be done entirely by hand. It is a welcome departure from the angular type so frequently constructed in school shops, and it is not any more difficult to construct. In educational content, it is far richer, especially the design, with all of its possibilities for variation and consequent development of appreciation.

CONSTRUCTION

Gumwood is suitable for the construction, but when an enameled or painted finish is desired, pine, poplar, or basswood may be used.

The groove for the slats may be made on a circular saw. If no saw is available, it is suggested that a bottom be substituted for the slats. This bottom can be made to rest on strips fastened to the inside. The ends may be fastened to the sides with round-head screws, and the stretcher may be held in place in the same way, or it may be nailed in place.

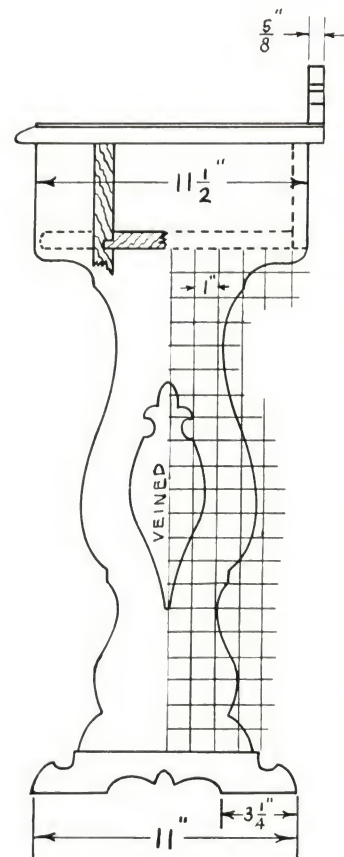
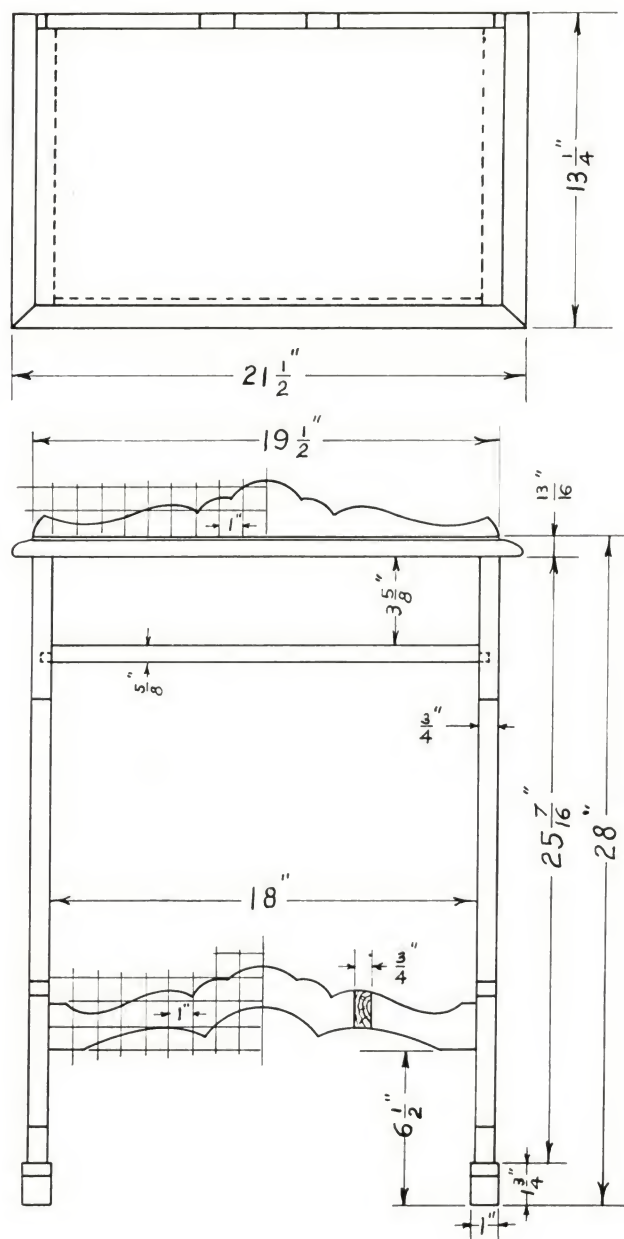
SUGGESTIONS

A pierced, applied, or veined design, two-toned, may effectually be used on the ends, if desired. See Plates 61, 62, and 63 for suggestions. The sides may be similarly treated.

The slight "boxy" appearance of the ends and sides may be relieved by veining and two-tone work similar to that used on the fernery on Plate 43.



Fig. 16. Fernery



TELEPHONE STAND

TELEPHONE STAND

The telephone stand in Figure 17 and Plate 24 is quite simple to construct, yet it is beautiful and practical. It is designed to fit near the wall, or in any position where the back is not visible. This type of telephone stand is very popular and is conveniently used with a stool as the one shown in Figure 18 and Plate 25. When not in use, the stool fits under the table, thus occupying a minimum amount of floor space.

CONSTRUCTION

Walnut, birch, or gumwood are suitable woods for this stand. Certain joints are suggested in the drawing, but conditions may make other joints imperative. Butt joints, held with flat-head screws counterbored and plugged may be used.

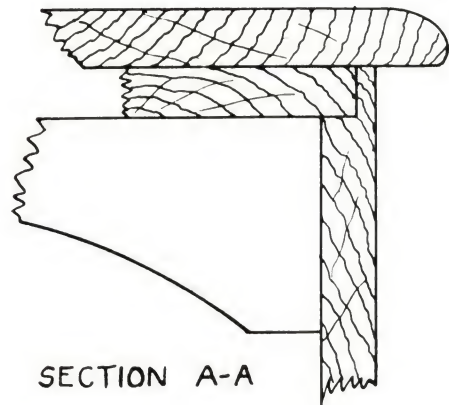
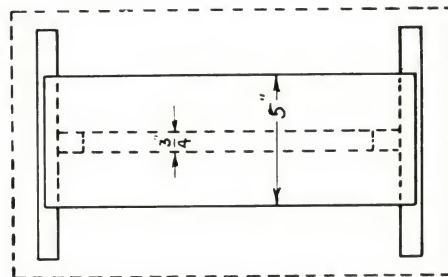


Fig. 17. Telephone Stand

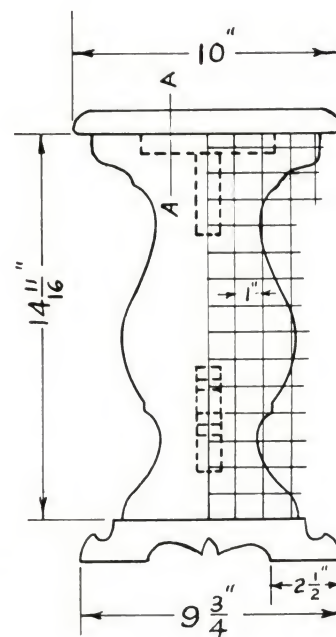
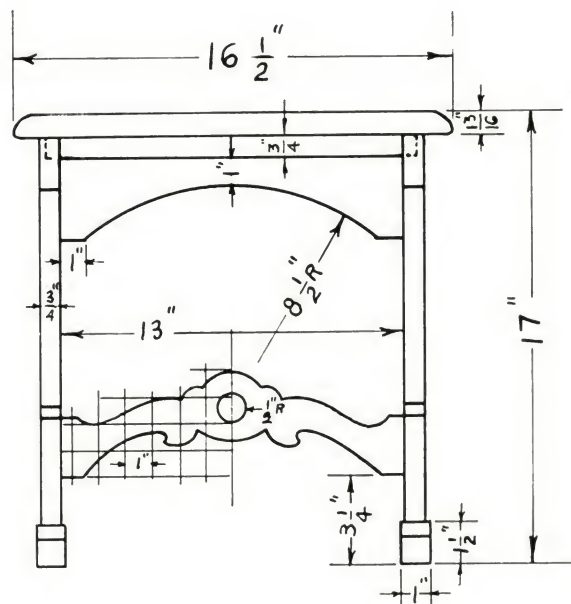
SUGGESTIONS

Here again the design may be varied with a freedom that is characteristic of this type of designing, the only limits being beautiful lines, proportion, and practicality of construction and use. Many end-table designs can be used for telephone stands of this type, by changing the upper part of the ends so that they will suitably house a shelf.

The student should make these adaptations himself, for they develop his ability to originate designs, and his analytical thinking. Thus, a boy wishing to make a telephone stand should not only work from Plate 24, but also from one or more drawings of end tables, and then develop a telephone stand of his own design, based on one of the end-table designs. This method will compel him to think and plan, and will be exceedingly worth while from an educational standpoint. The average student cannot originate unless he has something to begin with—something to tear down and assemble in new combinations. This experience will develop his originality.



SECTION A-A



STOOL

STOOL

The stool in Figure 18 and Plate 25 was designed for use with the telephone stand in Figure 17, or with the radio table or radio desk in Figures 37 and 38. Its lines are similar to those of the telephone stand. The stool, however, would prove equally useful as a dressing-table stool or just a simple bedroom stool.

CONSTRUCTION

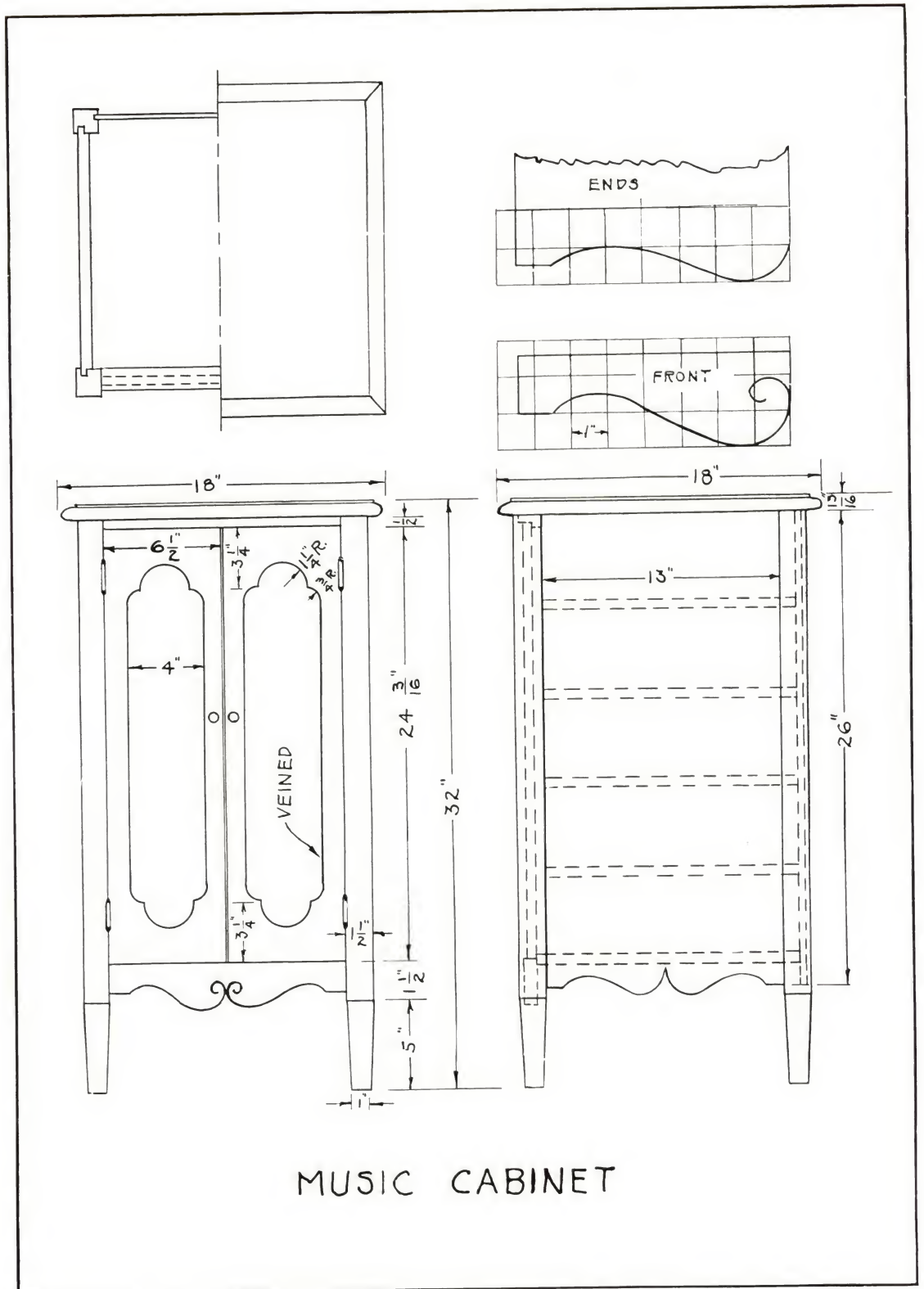
Walnut, birch, gumwood, or mahogany are well suited for this project, although cheaper woods may be used. If well joined with mortise-and-tenon joints, the stool is very rigid and substantial.

SUGGESTIONS

The ends of the stool may be given a lightened appearance by pierced enrichment, or even by veining and two-tone work. If used with the radio cabinet, it is suggested that a stretcher similar to that on the radio cabinet be used in order that it may harmonize with its companion piece. If used with the telephone stand, the stretcher should be made to harmonize with the stand. If used as a dressing stool, or as an occasional living-room stool or bench, it is suggested that the seat be upholstered. If this stool is to be used independently of either the radio cabinet or telephone stand, the stretcher on the stool shown is recommended for its simplicity and effectiveness.



Fig. 18. Stool



MUSIC CABINET

MUSIC CABINET

A music cabinet is a convenient place in which to keep either sheet music, player-piano rolls, or victrola records. The top of this cabinet would be a fine place for the portable victrola, or possibly for a lamp alongside of the piano.



Fig. 19. Music Cabinet

CONSTRUCTION

Plywood should be used for the back and sides of the cabinet, shown in Figure 19 and Plate 26. The sides should be rabbetted to fit into grooves in the legs, and the back may be made of thinner plywood and its full thickness set into grooves in the legs. Such joints, in this type of construction, if well made and properly glued, are very substantial. The rails above and below the doors may be doweled, and they will tie the front securely together. The doors should be plywood.

SUGGESTIONS

One door may be used instead of two. For the storage of victrola records, vertical compartments may be more desirable. Of course, both vertical and horizontal may be used. It is also well to have the partitions adjustable. The horizontal partitions can

be made to rest on any one of the many adjustable shelf rests on the market. The vertical partitions can be slipped into grooves.

CLOCK FRAME

The little clock shown in Plate 27, and those in Figures 20, 21, and 22, may be used in the living room, dining room, or bedroom. They would all make splendid gifts, and since they can be made of scraps of wood found in the average school shop, they should prove to be very popular problems.

CONSTRUCTION

The cove on the base of the clock on Plate 27, may be cut with a $\frac{1}{4}$ -inch gouge. A band saw may be used to cut out the material from the bottom of the base. An expansive bit is used to bore the hole for the clock movement. This hole must be made smaller or larger than the dimension shown on the drawing, depending upon the size required for the clock movement used. The center piece is then glued on the base.

Blocks larger than the finished brackets should then be planed to fit the base and the center piece, after which they may be cut to the shape shown on the drawing. The drawing shows two different styles of brackets; either one may be used. The little $\frac{1}{8}$ -inch pieces on top of the brackets are fastened in place after the brackets are glued in position.

SUGGESTIONS

Walnut, mahogany, or gumwood is suggested for this clock frame. The surface enrichment, shown in Figure 20, may be used on this clock. It may be painted on with a light-yellow enamel. This painting may be omitted, if desired, although it adds much to the appearance.

MANTEL CLOCK

The little mantel clock in Figure 20 and Plate 28 has all the attributes of the modern chime clock, less the chimes and the size. This clock and those on Plates 29 and 30 illustrate types which vary greatly in design and in difficulty of construction. Consequently, they will be found to be well suited to the varying ability of the average class.



Fig. 20. Mantel Clock

CONSTRUCTION

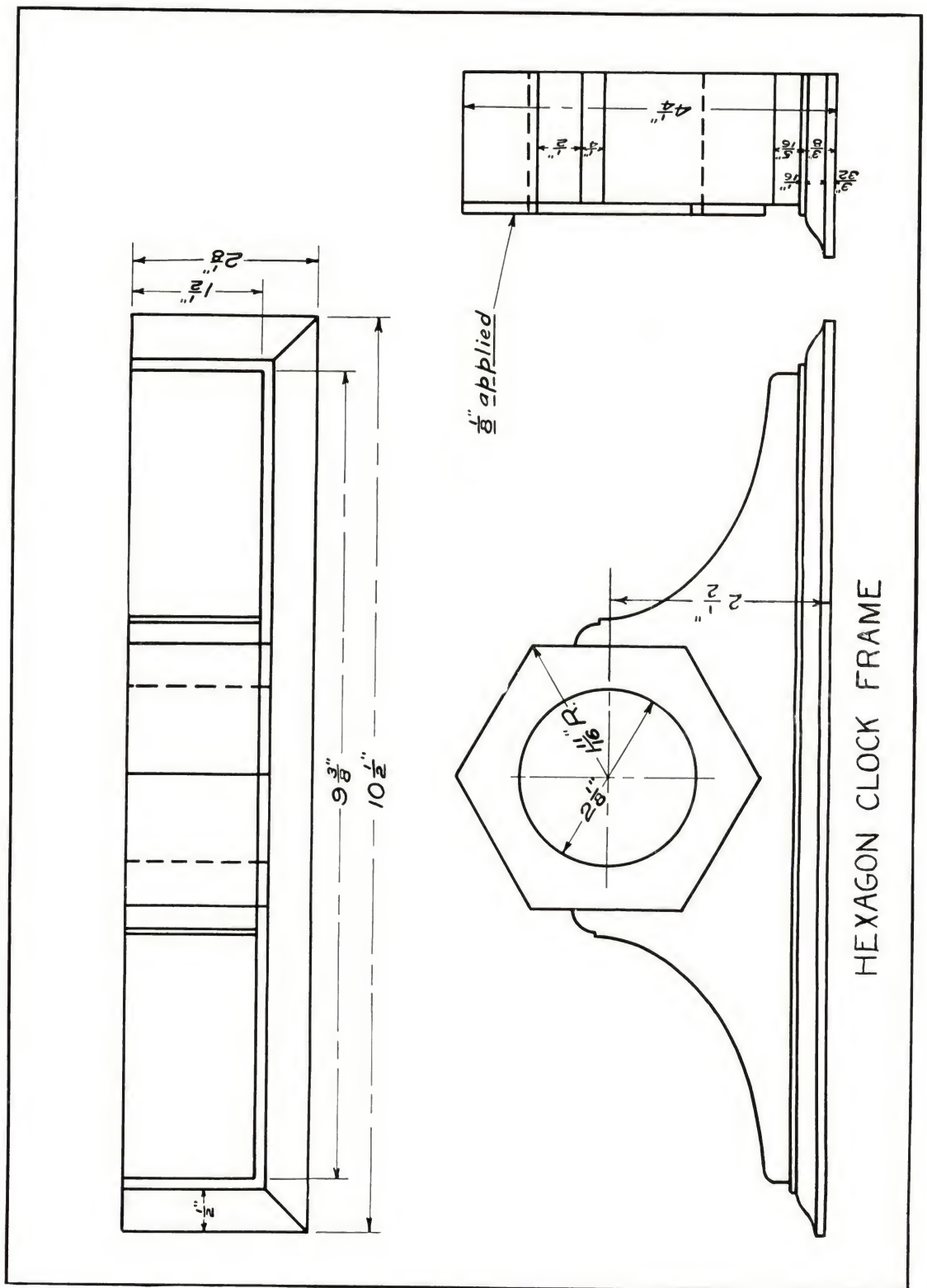
The base of this clock was made of five pieces, a center core of pine, a front, and two ends mitered around this core, and a thin veneering on the back of the base to cover the pine and end grain. This construction is quite elaborate, but it illustrates an approved method of fine work on such small details. It

also has an economic advantage, because of the small amount of material involved in illustrating such an important type of construction. No difficulty should be experienced in shaping the block which houses the movement. The cove at its base may be made with a small gouge or with a plane with a cove or fluting cutter.

SUGGESTIONS

The base may be made from one piece, if desired, care being taken to smooth the end grain perfectly. The cove may be omitted, but, if omitted, the base should be made correspondingly smaller. The surface enrichment is painted on, but could be left off without detracting too much from the appearance.

A one-piece base, no cove, and no surface enrichment greatly simplify the construction.



HEXAGON CLOCK FRAME

The clock frame in Figure 21 and Plate 29 is comparatively easy to construct, since there are only three pieces to make, and there is no difficult cutting and joining. It makes an attractive little clock for a desk, dresser, or mantel.

CONSTRUCTION

Use a backsaw, small patternmaker's gouge, chisel, and sandpaper for making the moulding on the base, if no shaper is available. The design of the part which houses the movement is next laid out on 1½-inch material. The hole

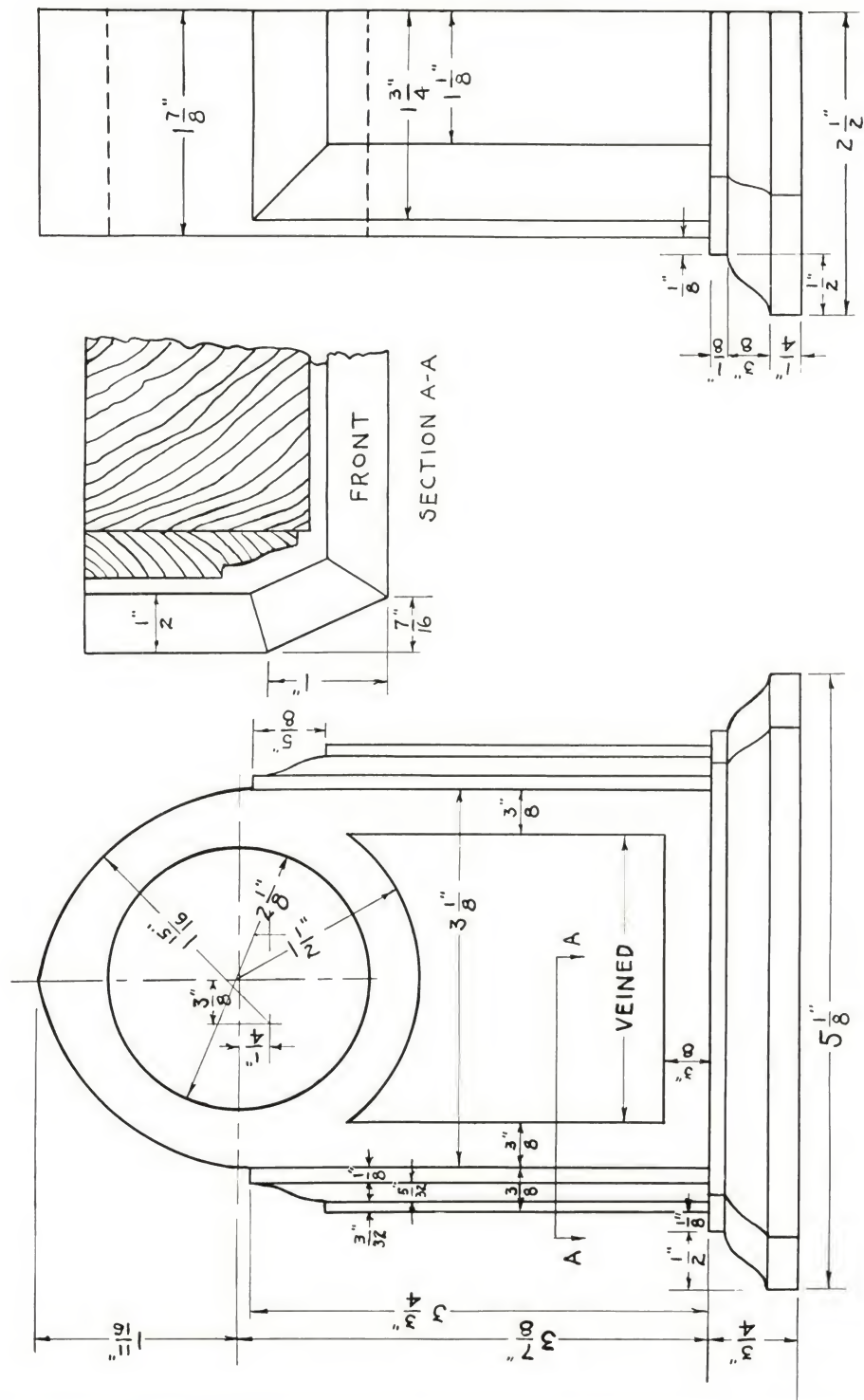


Fig. 21. Hexagon Clock Frame

for the clock movement is bored with an expansive bit; it is then sawed to shape on the band saw. Lay out the ⅛-inch applied hexagon on a piece of material considerably larger to prevent the piece from splitting when boring the hole for the movement. This piece is then worked to size and is glued to the face of the clock frame.

SUGGESTIONS

This clock frame may be constructed of any of the hardwoods, or if it is to be enameled, of any of the softwoods. The hexagonal applied piece should be stained darker or finished with black enamel. Figured gum finished natural, with the hexagon enameled black, makes an attractive little clock.



MANTREL CLOCK.

MANTEL CLOCK

The very early clocks were necessarily large and cumbersome because of the bulky movement. They were usually actuated by weights which needed room to descend. We still find some of the old clocks preserved in all of their originality, sometimes purely for sentimental reasons as exemplified by the modern demand for antiques. The small home or apartment usually has little room for unnecessary articles. But little mantel clocks like the one in Figure 22 and Plate 30 are always welcome. The making of this clock and those on Plates 27, 28, and 29 utilizes the small pieces of wood which accumulate in every school shop.

CONSTRUCTION

This little clock is made of four pieces, the body, the base, and the mouldings on each side of the body. The body may be made first of $1\frac{7}{8}$ -inch material. Next, get out material for the base which is $\frac{3}{4}$ inch thick, cut to shape as shown on the drawing. It is now ready for the moulding which may be made by hand. The base is then glued onto the body, after which the mouldings on the side of the body are made of $\frac{3}{8}$ -inch material. The moulding on these pieces may be made by hand if no shaper is available. Be sure to make these pieces right and left.



Fig. 22. Mantel Clock

SUGGESTIONS

The clock may be made of walnut, mahogany, or gumwood. The clock illustrated was finished with a dark walnut stain and the panel was finished natural. The outline of the panel was cut with a small veining tool. If the total height of the clock is reduced about $\frac{3}{4}$ inch, the moulding on the sides may be omitted. If the mouldings are omitted, the two front corners of the base should not be cut off, and the base should be made shorter by an amount equal to the combined thickness of the side mouldings. This would greatly simplify the construction, and yet the interesting shape of the primary mass would be retained. If, in addition to the above suggestion, a more simple moulding is used on the base, this clock will then be within the ability of students who otherwise would be unable to make it as drawn.

JUNIOR FLOOR LAMP

Floor lamps, table lamps, reading lamps, bridge lamps, large lamps, small lamps, all have their place in the home, and they add much charm and attractiveness to a setting. The junior floor lamp in Figure 23, Plate 31, occupies very little space, and will find a place in any home not already having such a lamp.

CONSTRUCTION

The construction is evident from Plate 31. Of course, the stock for the shaft should be glued up with a groove running through the center for the lamp cord. The shaft was designed to be turned in two sections, since many school shops do not have lathes long enough to handle the shaft in one piece. To prevent the work from chattering when turning the longer part of the shaft, it may be necessary to support the work in the lathe so that it will not spring back when pressure is applied with the turning tool. Remember to make allowance for a turned dowel on the lower end and on the shaft for joining together.

SUGGESTIONS

If desired, the lamp may be made higher by merely lengthening the longer taper near the top and using the other dimensions as given on the drawing. However, there is a tendency to make floor lamps a little shorter than they formerly were made, possibly because of the lower ceilings in our newer homes and apartments.

The lighting fixture may be fastened by screwing a pipe nipple into the top of the shaft. When a student completes a lamp, it is suggested that he be required to wire it at school. Many boys are not in a position at home to receive proper instruction regarding this really simple task, and the instructor should feel it is his privilege to help and instruct the boy concerning the wiring. See that he does the job right, from the fixture to the plug, and you will thereby increase his store of useful knowledge.



Fig. 23. Junior Floor Lamp

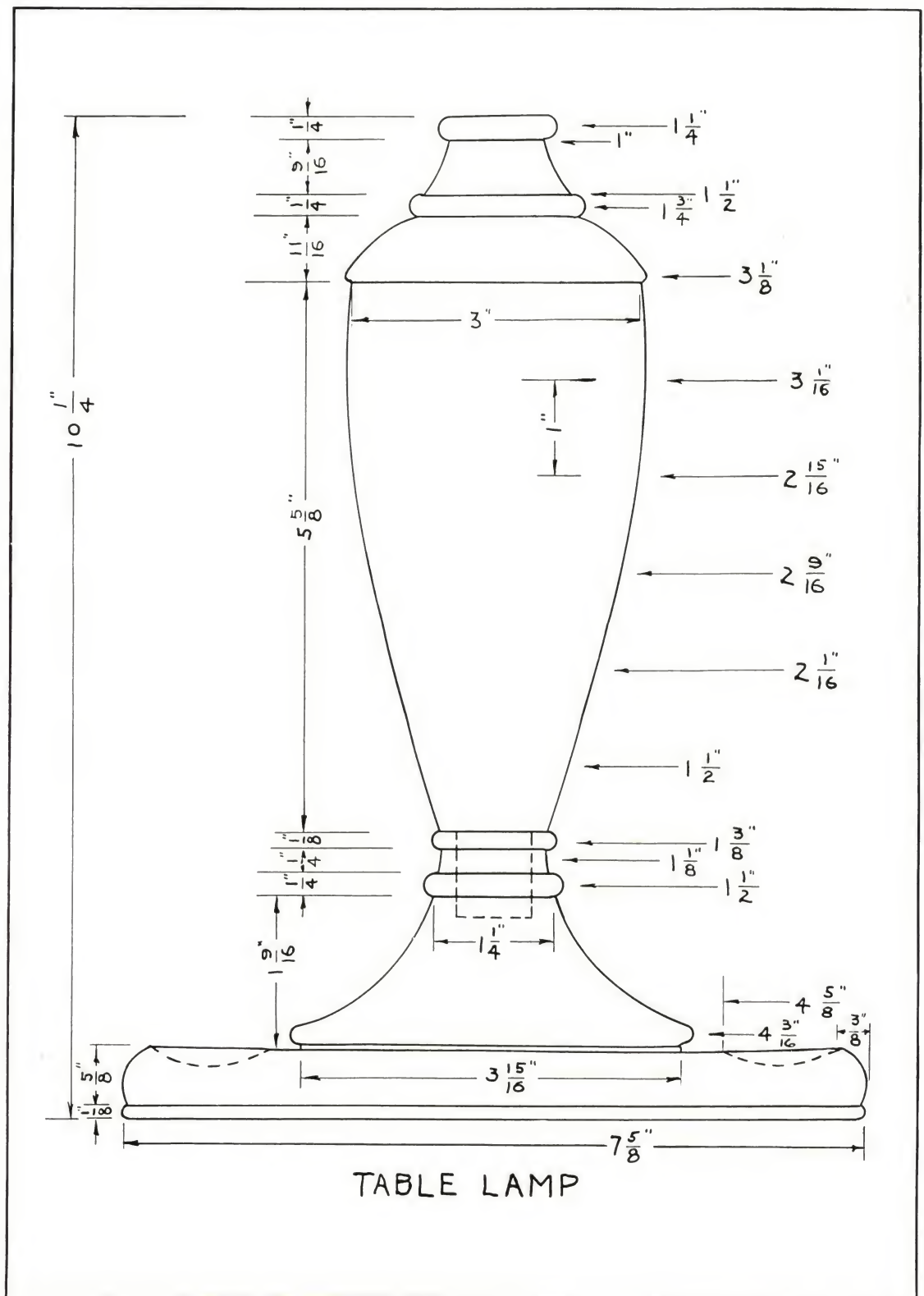


Plate 32

[Sixty-four]

TABLE LAMP

The table lamp in Figure 24 and Plate 32, and those on Plates 33 to 37 inclusive, represent the latest in turned table lamps. All are different, and each has strength and character of line. What a contrast between these lamps and those sometimes seen, which seem to be wood-turning-drill exercises because of the weakness in design. A motley collection of assorted sizes of beads and shoulders will not make a beautiful lamp. Forceful curves, relieved now and then by beads and shoulders, interestingly grouped so that the whole has a center of interest, or a dominant part, with all other parts subdued yet contributing to the effect — such is the analysis of good design in turned work.

CONSTRUCTION

Since these lamps are quite wide at the thickest part, they may be built up at those points by gluing blocks around the core, thus utilizing what might otherwise be scrap. The hole in the center of the lamp for the lamp cord may be made before the lamp is turned, if desired, but the ends of the hole will have to be plugged to permit the centering of the work in the lathe. Be sure to make allowance for a tenon on the end of the shaft for fastening to the base.



Fig. 24. Table Lamp

SUGGESTIONS

Any wood, even the cheapest, may be utilized for this project, if paint, enamel, or gesso is used for the finish. Flutes, either painted or carved, could be effectively used on some part of each of these lamps, and in some cases the beads could be carved with patterns like 1, 2, and 3 in Figure 49. The beads also could be painted or enameled with a simple pattern of dots and dashes or be done in a solid color to contrast with the body of the lamp. The lamp shown in the cut is finished in enamel.

The light fixture may be fastened to the top of the lamp by means of a pipe nipple screwed into the wood.

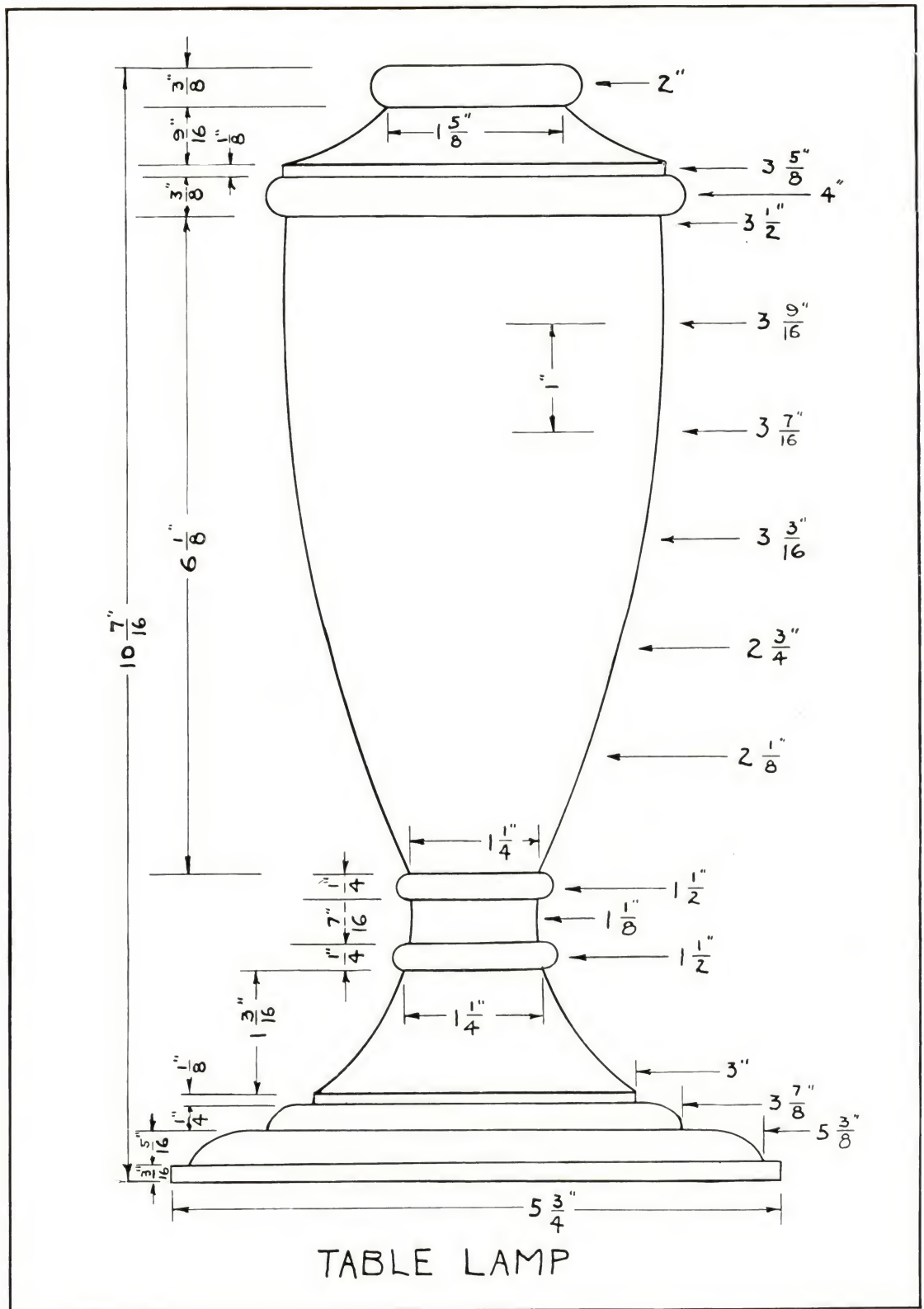


Plate 33

[*Sixty-eight*]

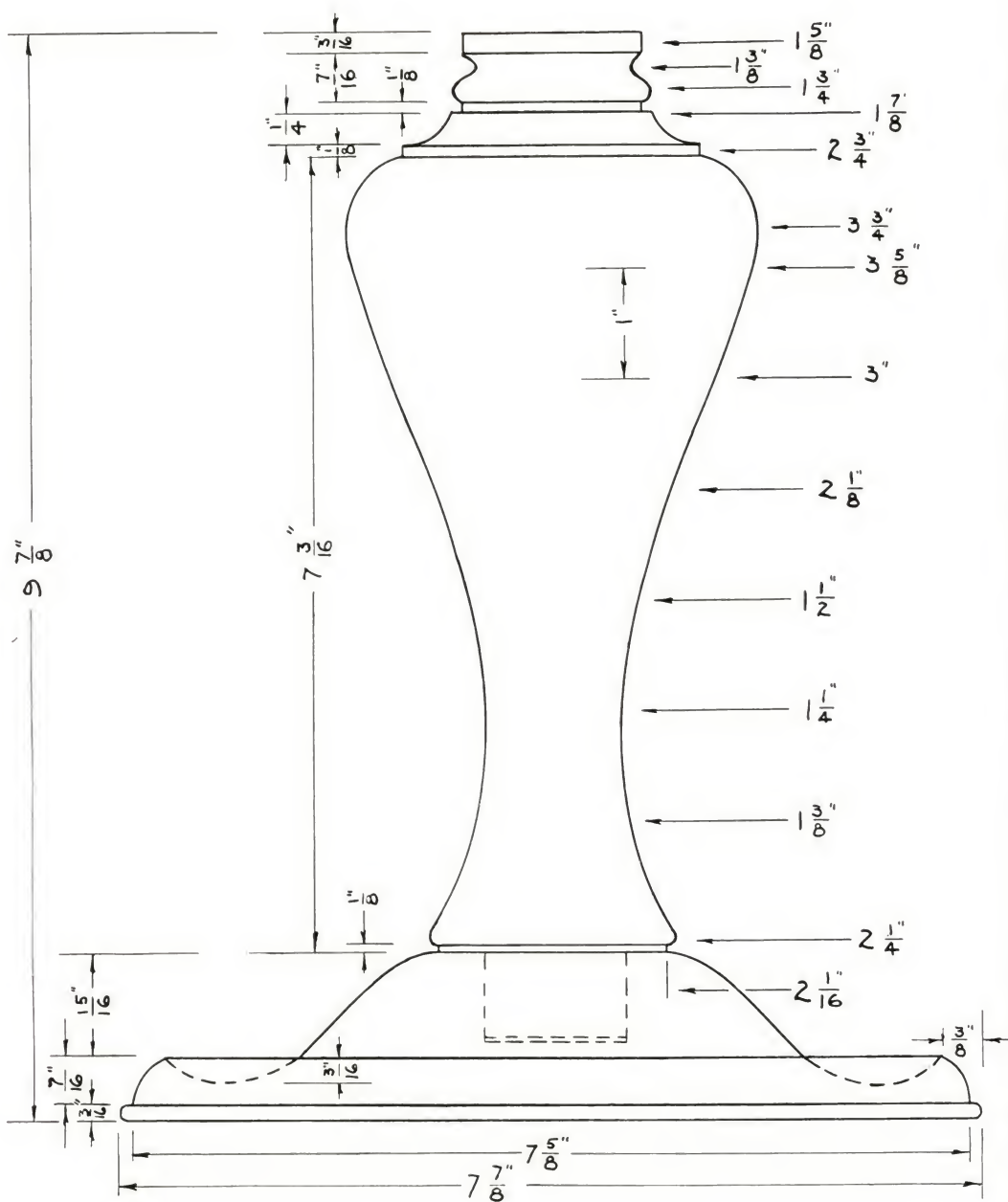


TABLE LAMP

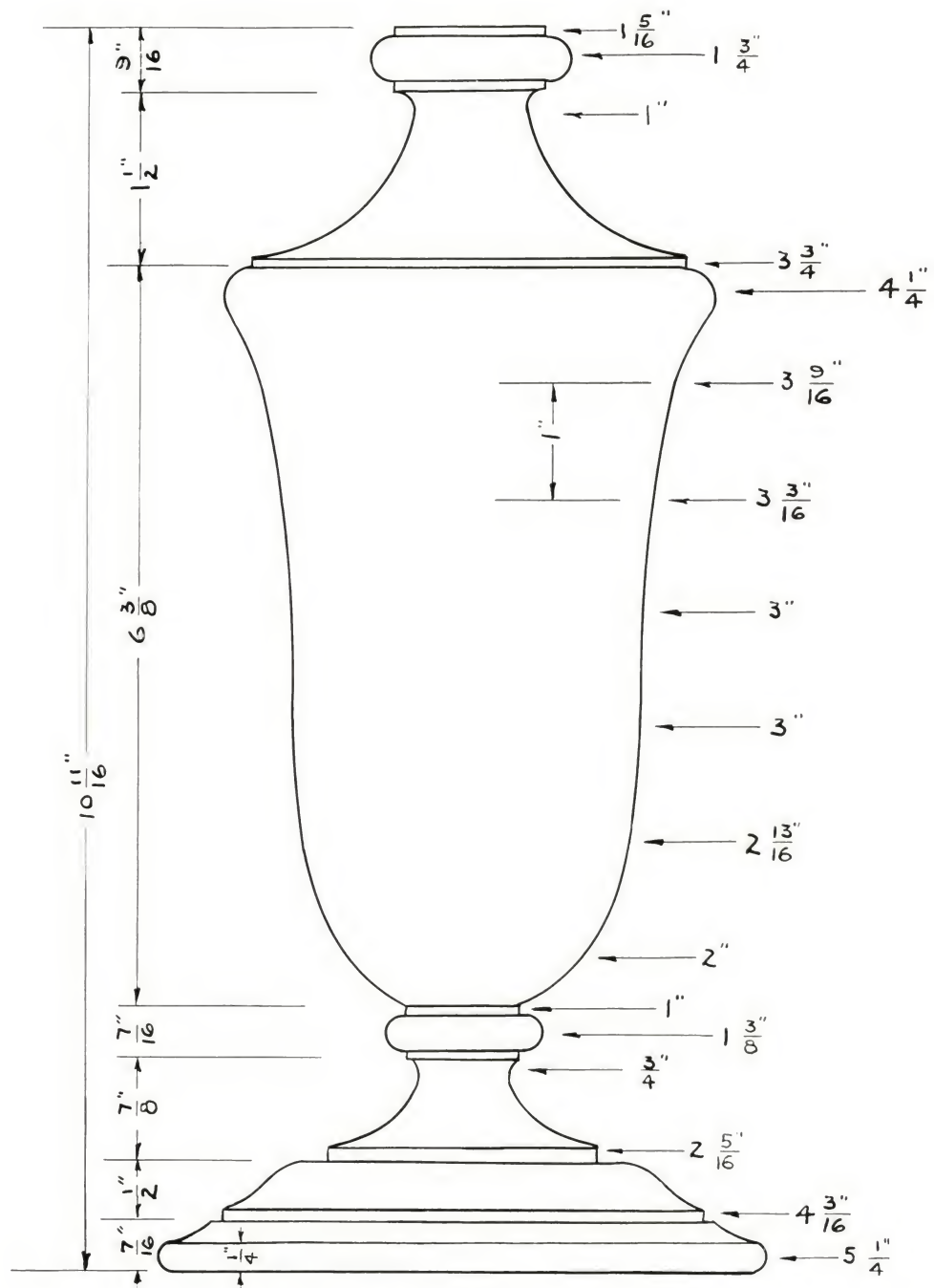
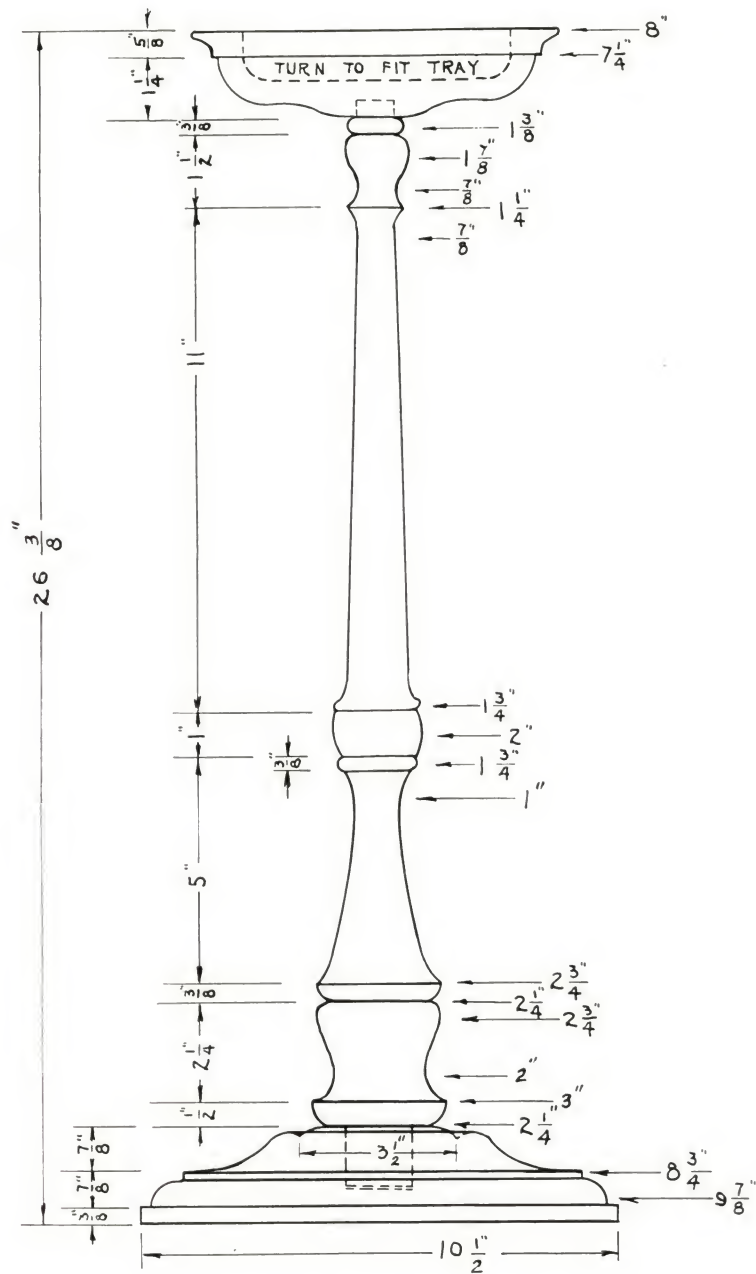
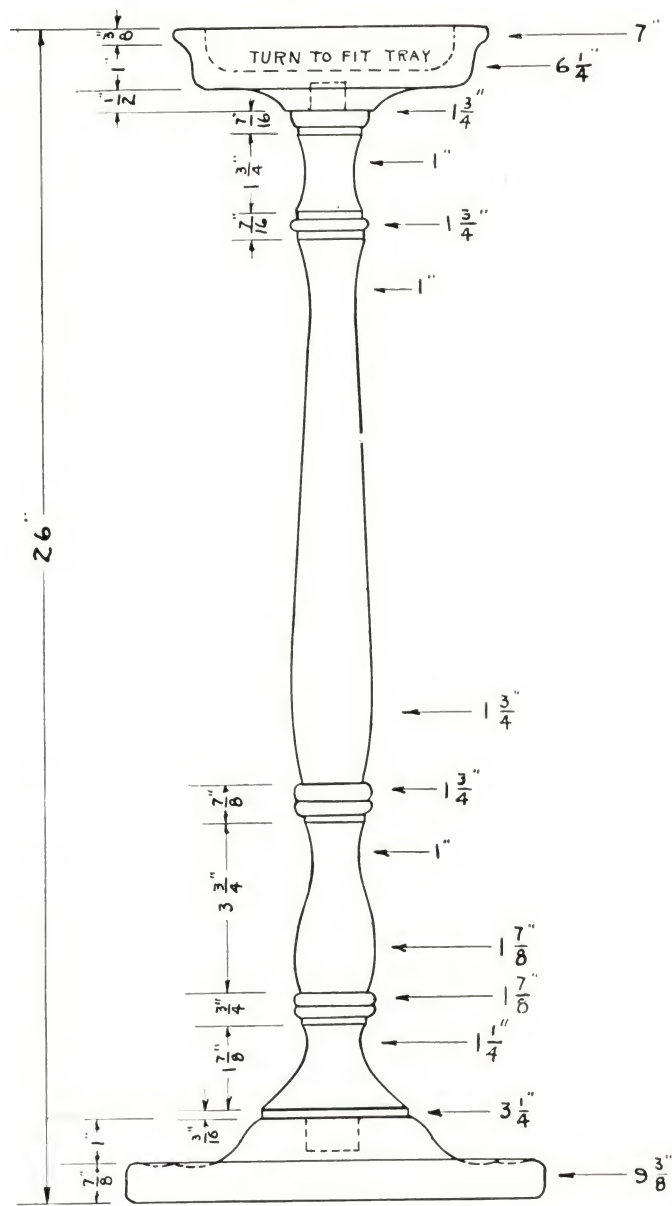


TABLE LAMP



TURNED SMOKING STAND



TURNED SMOKING STAND

TURNUED SMOKING STAND

The turned smoking stand is a creation of our age and apparently it has come to stay. It is a good wood-turning exercise, which requires both spindle and face-plate turning.

CONSTRUCTION

The construction of the smoking stands in Figure 25 and Plates 38 and 39 is, of course, evident. Remember to make allowance for a turned dowel on each end of the spindle for joining to the base and the top. Defer the permanent assembly until the stand is finished, and thus take advantage of the convenience in sanding between coats, with the work in the lathe.

SUGGESTIONS

Smoking stands may be designed to meet the requirements of individual students, for the purpose of giving them practice in certain types of turning. Beadwork, compound curves, long tapers, or whatever is desired, usually can be incorporated into a design and thus the practice is motivated and given purpose.

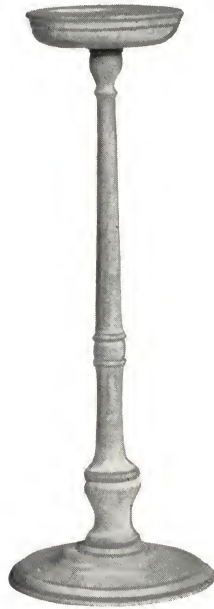


Fig. 25. Turned
Smoking Stand

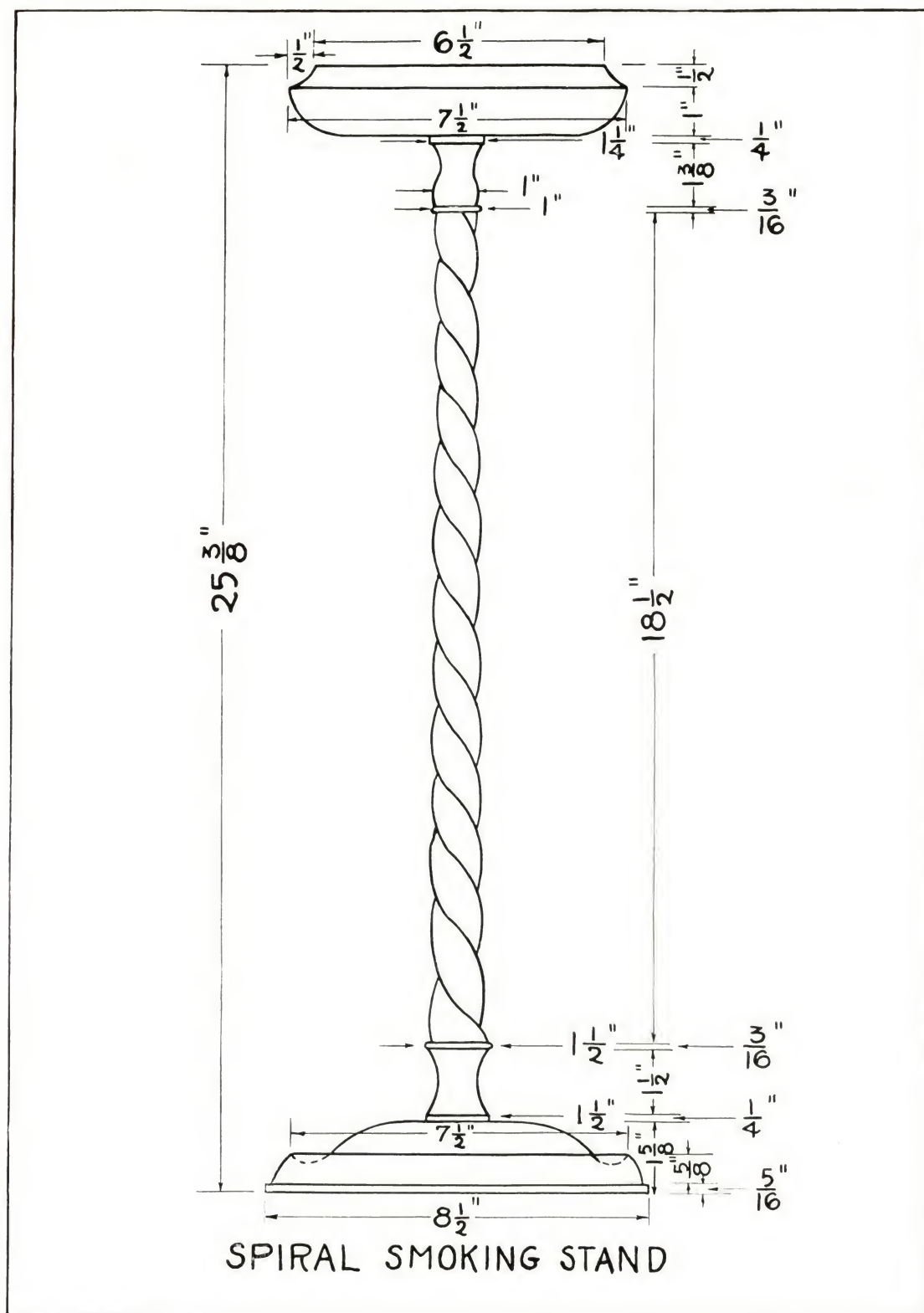


Plate 40

SPIRAL SMOKING STAND

The construction of a spiral smoking stand, as shown in Figure 26 and Plate 40, is not nearly so difficult as might be imagined by anyone who has never done any spiral carving of this type. The first step, in the making of the spiral, is the turning of the long taper which is to be carved into the spiral. After the taper is turned, lay out four lines parallel to the axis and equally spaced. Beginning at the lower end, divide the taper into 1-inch segments. Spin the work in the lathe, and mark the circles with a pencil. See the model, Figure 27, illustrating the lines parallel to the axis, and the lines forming the segments. The only difference between this model and the smoking stand described here, is that the model is hexagonal before carving and the smoking stand is round. The intersection of the four parallel lines with the circular lines, forming the segments, determines points through which the helix is drawn. Two helixes are required, one beginning opposite the other.



Fig. 26. Spiral Smoking Stand

Saw along the entire length of helical lines, to a depth of about $\frac{1}{4}$ inch, with a backsaw. Then, with a good sharp chisel, begin carving toward the saw kerf. The illustration of the model shows part of the carving completed, and illustrates how the helix takes form. The judicious use of a cabinet file will help greatly in removing the arrises left by the chisel. It will be found to be very convenient to do all of the carving with the work held rigidly in the lathe.

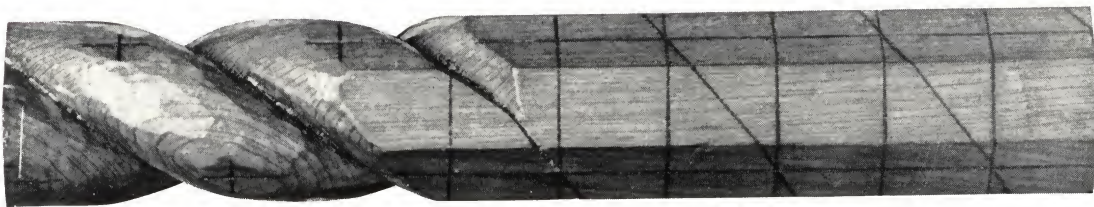


Fig. 27. Spiral Layout and Carving

MIRROR FRAMES

Nothing breaks up a monotonous wall space so effectively as does a wall mirror. Nothing so completes a console table with its air of distinction as does a mirror. It often is hung in line with the entrance, or in some other place where guests entering the home may see their reflection.



Fig. 28. Mirror Frame

CONSTRUCTION

The construction of the two frames in Plate 41 is the same. The only difference is the addition of the $\frac{1}{8}$ by $\frac{1}{4}$ -inch strip around the outside edge of the one at the right, and the carving which is applied at the top. The reproduction of a pencil rendering of the carving is shown on Plate 65. The carving at its thickest part, at the scrolls, is $\frac{3}{8}$ inch thick. The sprigs of leaves on either side taper from $\frac{3}{8}$ to $\frac{1}{8}$ inch. It is well to taper the carving blanks before beginning carving. This carving is not at all difficult for anyone with a little artistic skill, patience, and tool control. This little cove on the inside of the frame was made entirely by hand with a small gouge. If a shaper is available this operation will be very much simplified. The enrichment of the other frame is all

veined, and it also presents a dignified appearance. Note the change in outside profile at the bottom. Dowels were used to strengthen the joints.

SUGGESTIONS

Your attention is called to the $\frac{3}{4}$ -inch thickness of these frames. This is not too thin, either for practical purposes or from the standpoint of appearance; in fact, if it is made appreciably thicker the appearance will be ruined. If made of walnut, the frame looks well with the applied strip stained black against the standard brown of the remainder of the frame. If desired, the cove on the frame at the left may be gilded.

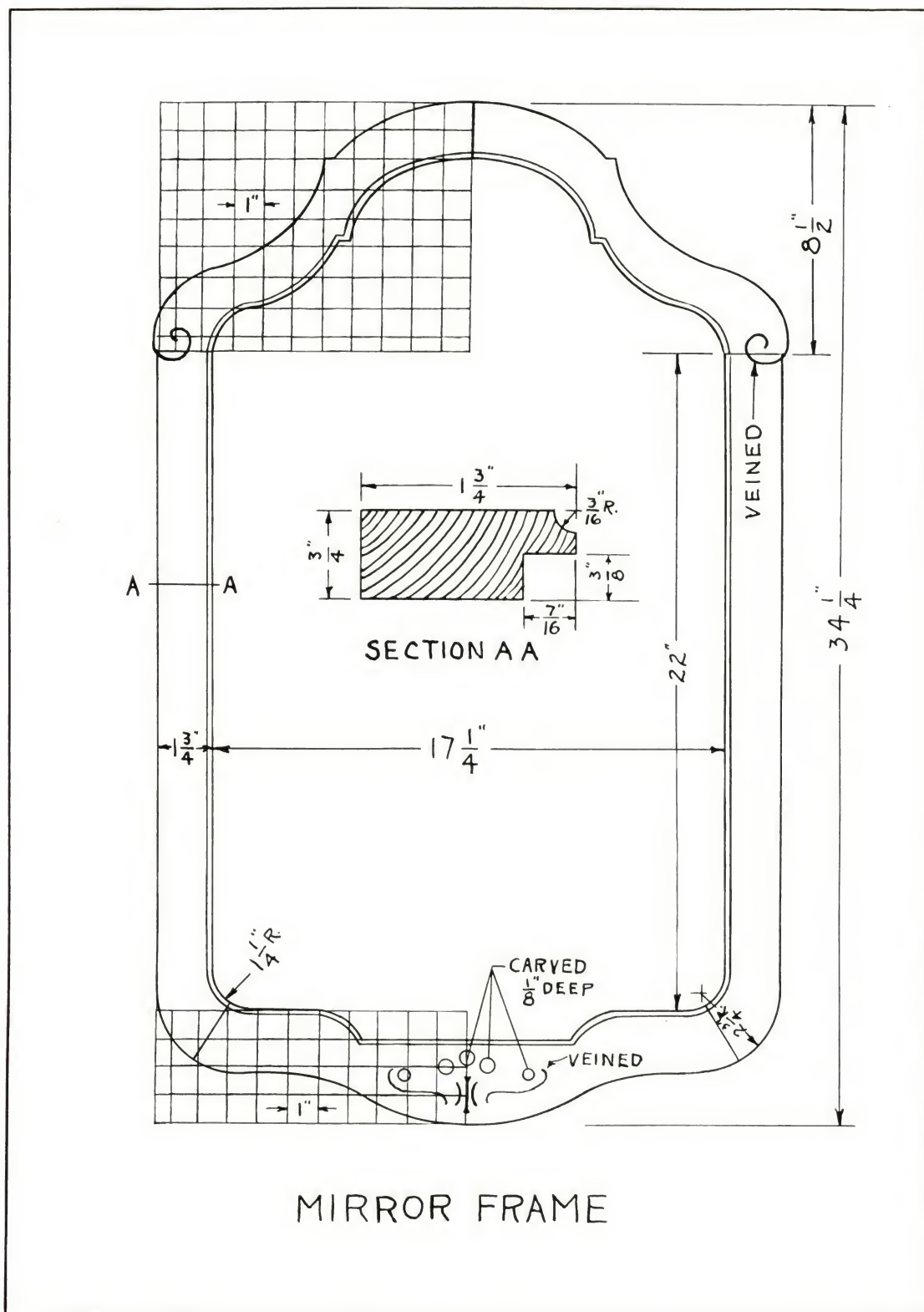


Plate 42

[Seventy-eight]

MIRROR FRAME

The mirror in house decoration serves in many useful ways. It may be hung in such a way as to give the effect of spaciousness to a small room, or to brighten a dull wall by its reflection or spot of light. Many an uninteresting wall can be changed to something with character and beauty, by means of a mirror in the right place. The mirror frame in Figure 29 and Plate 42 was designed as a complement of the console table shown on Plate 53. The popularity of the console table and mirror is a tribute to the increase in public understanding and appreciation of beauty and ornament, as applied to home furnishing.

CONSTRUCTION

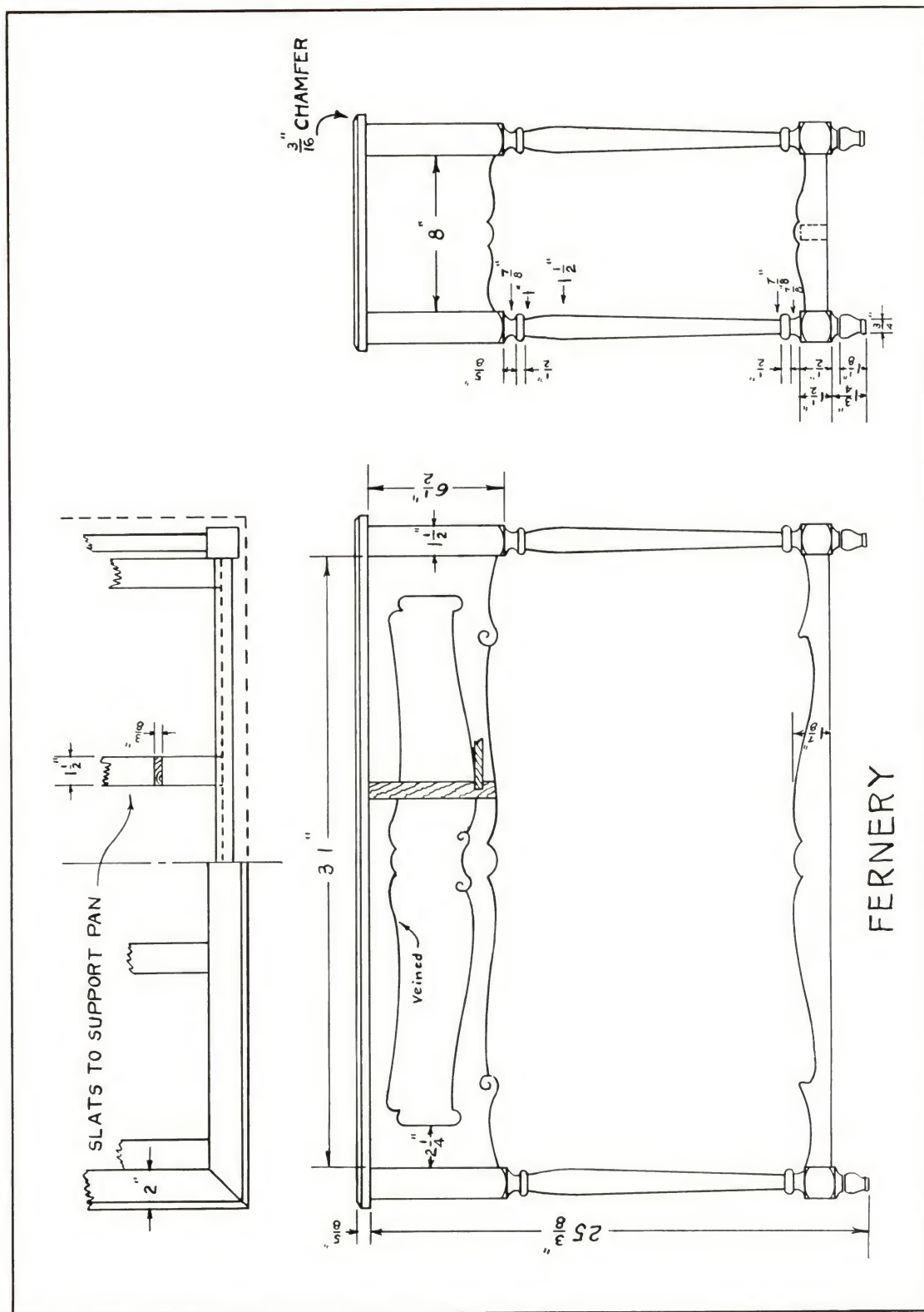
This mirror frame is built up of five pieces, joined with dowel joints. A complete trial assembly should be made to make sure that the joints draw up properly. Both the inside and outside edges may be smoothed to the line after the glue has set. The cove and the rabbet can be made best with a shaper, although these two operations may be performed by hand, if necessary.

SUGGESTIONS

If no shaper is available the cove may be omitted and the inside edge may be slightly rounded instead. The round may be relieved by some form of simple carving similar to Number 1 or 2 in Figure 49. This carving will be found to be much more easily done than making the cove by hand.



Fig. 29. Mirror Frame



FERNERY (TURNED LEGS)

A fernery, like the one illustrated in Figure 30 and Plate 43, would be a credit to the setting of any room where growing plants are kept. A fernery is the logical place for growing things, and their proper grouping adds to the cheering effect.

CONSTRUCTION

Doweled butt joints will serve for the sides, ends, and stretcher. The construction indicated in the drawing for the support of the pan is recommend-

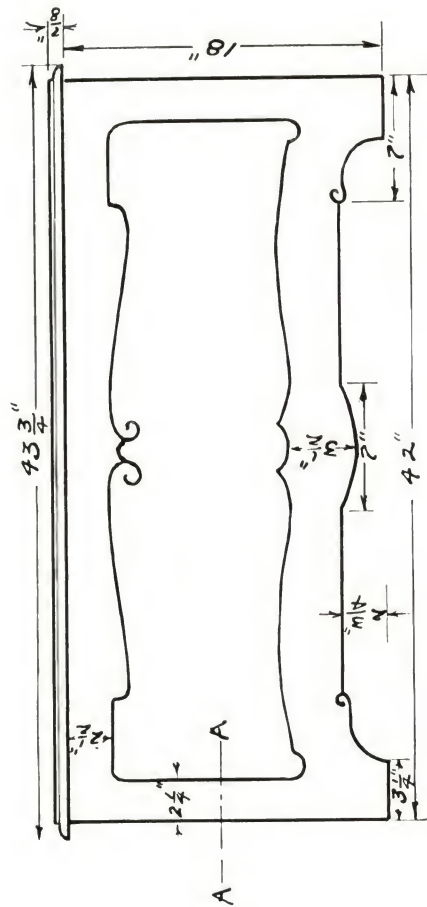
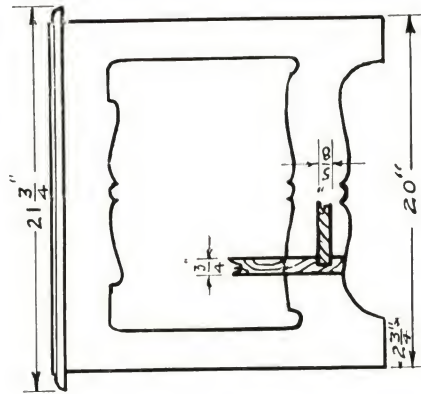
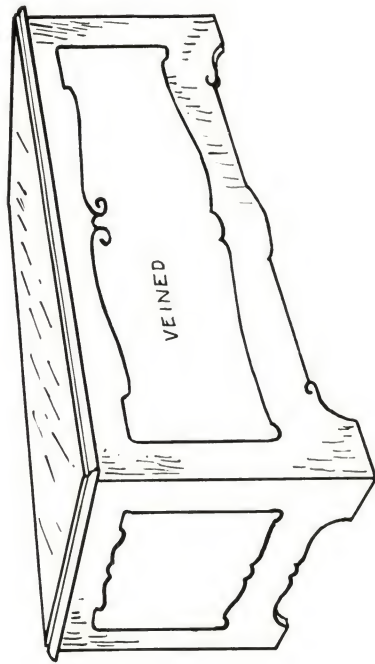


Fig. 30. Fernery

ed as a practical and economical method. The frame around the top adds much to the appearance, giving it the requisite finish. It is also a valuable experience in mitering.

SUGGESTIONS

If no lathe is available, the legs may be tapered and the profile of the box simplified to harmonize. The veining also may be eliminated and a central applied motif substituted, but if ability warrants it, by all means vein it, and apply a two-toned finish like in the illustration. The frame around the top may be very effectively carved with a simple running border, like a row of long beads similar to the samples illustrated in Figure 49.



SECTION AT A A

CHEST

CHESTS

Chests in some form were used by the earliest civilized peoples, and at one time occupied an important place in the household. These early chests were sometimes used for a threefold purpose—as a place to store valuables, as a seat, and as a bed. Chests, in the original boxlike form, constructed of cedar, are extensively used today, principally for the storing of clothes. The chest shown in Figure 31 and Plate 44, was constructed of walnut, and the bottom of $\frac{3}{4}$ -inch red cedar.

CONSTRUCTION

The construction is evident from the drawing. Make a trial assembly before gluing the ends and sides. Glue-size the end grain before the permanent assembly. One way of lining the box with cedar is to have the grain



Fig. 31. Chest

run vertically to within an inch or so of the top, and then finishing off and covering the end grain with a moulding mitered around the inside of the box. Very thin, resawed cedar may be used for the lining; $\frac{3}{8}$ inch in thickness, or less.

SUGGESTIONS

Since the construction is devoid of all ornament, it is obvious that the rich appearance is due to the appropriate veining and two-tone treatment of the various surfaces. There is a considerable amount of veining to do on this chest, but it is very easily done with a $\frac{1}{16}$ -inch round-nose veining tool. Boys in the grades have used these veining tools with great success and their addition to the tool equipment is recommended, for there is much opportunity for veined work on modern furniture.

BEDSIDE TABLE

Here is a project, rich in line and in variety of construction experience. It is not at all limited to that use which the title suggests, for small tables of this kind seem to be ever in demand in practically every room in the home, and no doubt someone's special taste or requirements will find this to be just the table needed.

CONSTRUCTION

The rails may be either doweled or mortise-and-tenon joints. Attention is called to the simplicity of the drawer-runner construction. The beading on the rails and lower shelf was made with a hand plow and is very effective. In turning the legs, be sure to get the bulge in the long tapered part, for this is an essential part of the design.

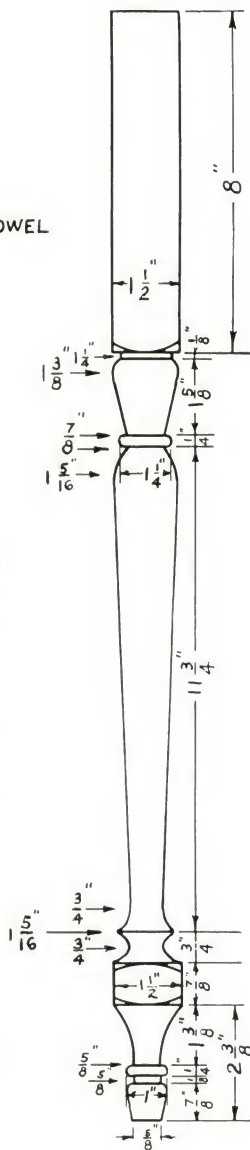
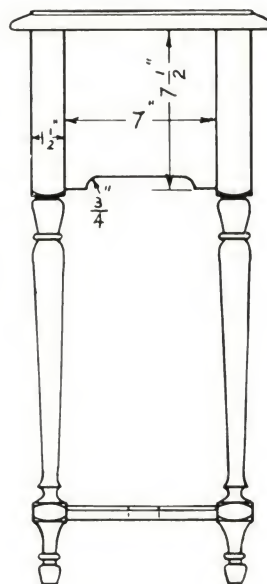
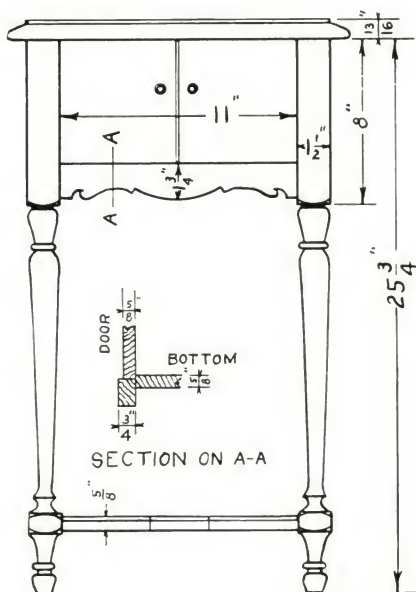
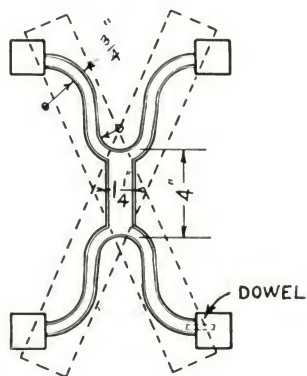
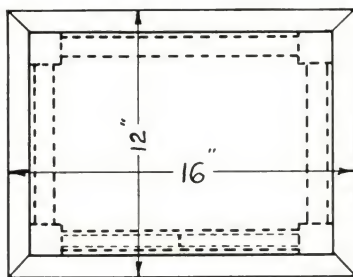
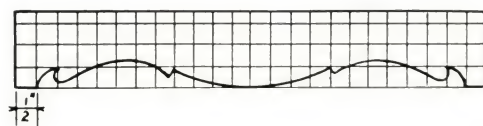
SUGGESTIONS

If no hand plow or shaper is available, the beading may be omitted. The edges of the shelf at the bottom should then be rounded, not with a cheap looking half-round, but with a long-radius round. See the top mould on the left side of Plate 3. The edges will thus be rounded at the same time creating new corners. By changing the design of the legs, using wider rails, and substituting doors for the drawer, a smoking cabinet similar to the one on Plate 46 can be made.

Some suggestions for fastening the shelf to the legs appear on Plate 10.



Fig. 32. Bedside Table



SMOKING CABINET

SMOKING CABINET

The smoking cabinet, illustrated in Figure 33 and Plate 46, suggests other uses besides that ordinarily made of a smoking stand. It makes a fine little stand for a plant, or cut flowers, and the cabinet space will also prove useful.

CONSTRUCTION

The cabinet, although small, brings in quite a variety of cabinet construction. Dowel joints may be used throughout, and the bottom may be set in grooves in the ends and back rail. Although the doors are quite small, they should be made of five-ply, to prevent warping and undue swelling or shrinking. Attention is called to the stretcher layout. This construction makes a strong stretcher, free from the danger of breakage along the grain of its narrow section. A glued cross-lap joint is used, and the only difficult part of the stretcher is the cove around the top edge which must be made by hand if no shaper is available. The cove may be omitted, if desired. See Plate 64 for a method of fastening the top, and Figure 48 for directions for producing the top mould.

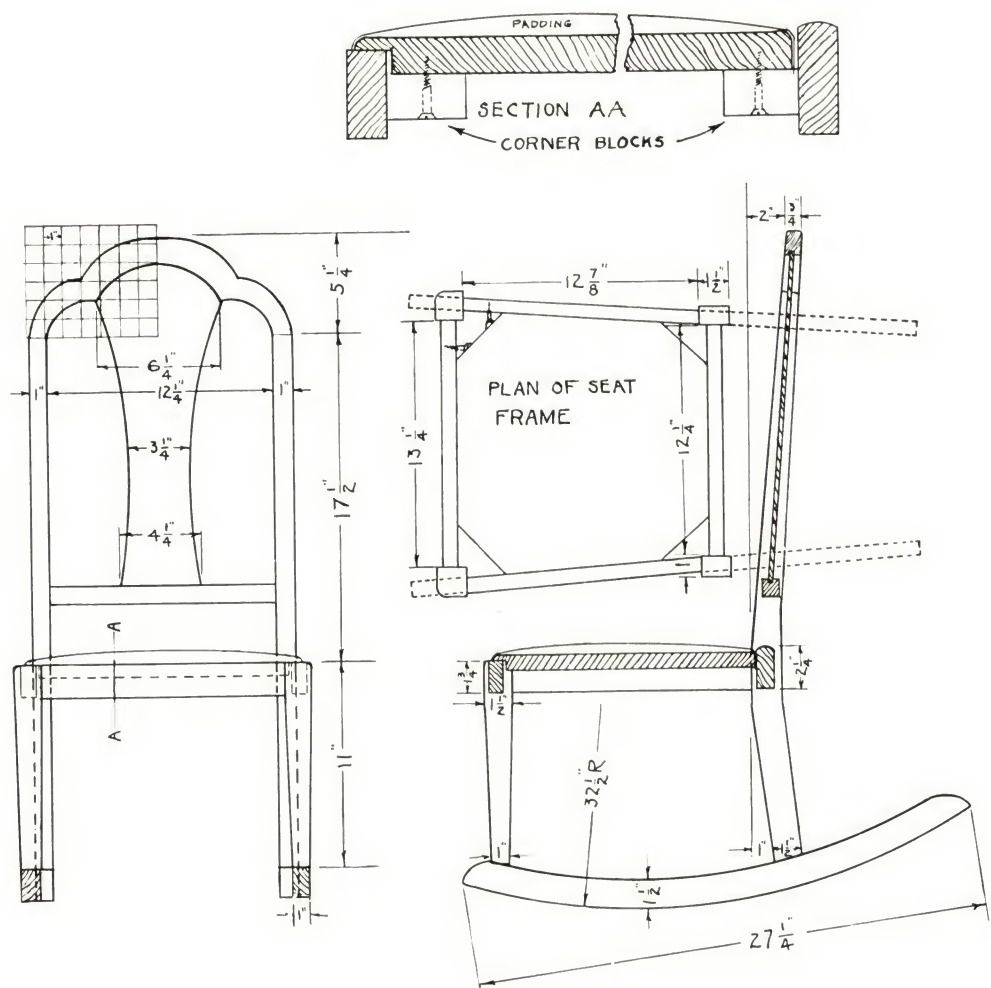


Fig. 33. Smoking Cabinet

SUGGESTIONS

By making the rails narrower and substituting a drawer for the doors, this project will serve well for a small bedside table similar to the one on Plate 45.

If no lathe is available, the legs may be tapered and the profile of the rails and stretcher simplified to harmonize, thus bringing the construction within the limits of the equipment at hand.



BEDROOM ROCKER

Some of our foreign friends claim that we show our restless spirit by our great use of rockers. Be that as it may, nevertheless, the rocker is granted the place of honor in the home. Practically every living-room suite includes a rocker, but not every bedroom suite includes one. Yet, what a convenient place to sit and sing the evening lullaby.

The front legs of the rocker in Figure 34 were turned so as to harmonize with the suite with which it was to be used. Some rockers have the annoying tendency to make one slide forward on the seat, or, what is even more annoying, there are those which give the uncomfortable feeling of tipping backward. Such a rocker has not the proper balance or swing, and is very uncomfortable to sit in. Since this rocker has no bent or curved rails, its construction is simple enough to be within the ability of the average student.



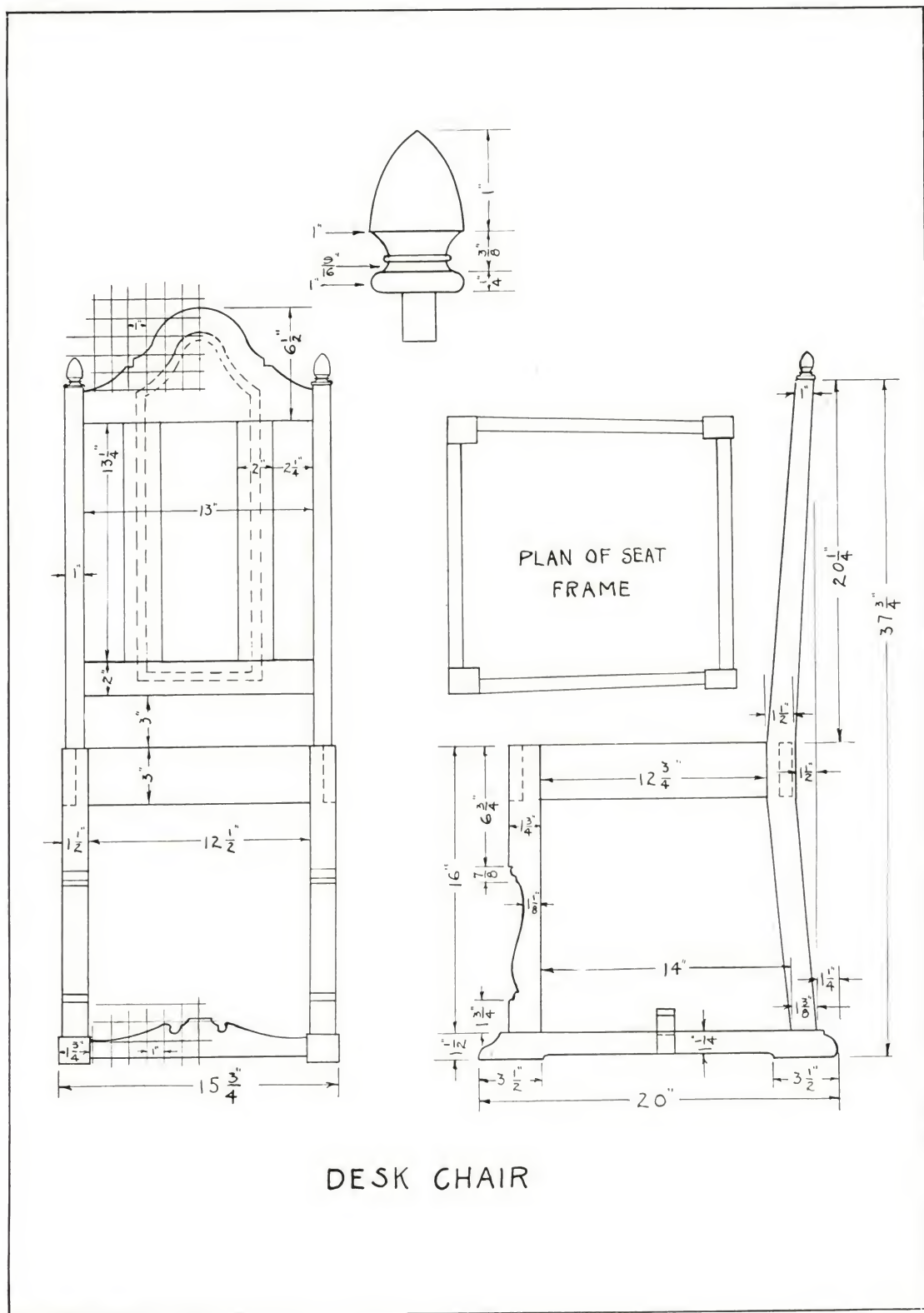
Fig. 34. Bedroom Rocker

CONSTRUCTION

An accurate layout of this rocker will be necessary in order to get the lengths and bevels of the various pieces. Dowel joints were used on all rails. The rockers were also doweled to the legs, and the three-ply back panel was grooved into the rails. The padded seat rests on corner blocks, and a screw from the bottom of the corner blocks holds the seat in place.

SUGGESTIONS

Walnut, mahogany, or gumwood may be used for this rocker. A turned front leg may be used instead of the tapered leg shown on the drawing. After the rockers are doweled in place, it is well to set in another dowel at an angle in the rear legs. The extra dowel set at an angle forms a lock joint, which prevents this important joint from failing.



DESK CHAIR

DESK CHAIR

The chair shown in Figure 35 and Plate 48 is not only a comfortable desk chair, but it serves very well as a formal reception chair, especially when the desk and chair are set in the reception room. It is a convenient seat for the visitor who drops in for a few moments to say "howdy." If the desk is set in the living room, this chair, or some other suitable chair, is necessary for one to use the desk comfortably, for the usual overstuffed chairs of the living room are poorly adapted to this use. Since the seat and back of this chair are upholstered, it will fit in nicely with the living-room suite, especially if the fabric used harmonizes with the other pieces.

CONSTRUCTION

Make a full-size layout of the seat. All joints are doweled. The rails forming the seat, although covered, should be made of birch because the webbing supporting the springs is stretched on the underside of these rails. If they are made of softwood the tacks will pull out when the upholstering is being done.

SUGGESTIONS

Walnut, mahogany, or gumwood is suggested for making this chair. It was designed to go with the wall desk shown on Plate 49.



Fig. 35. Desk Chair

WALL DESK

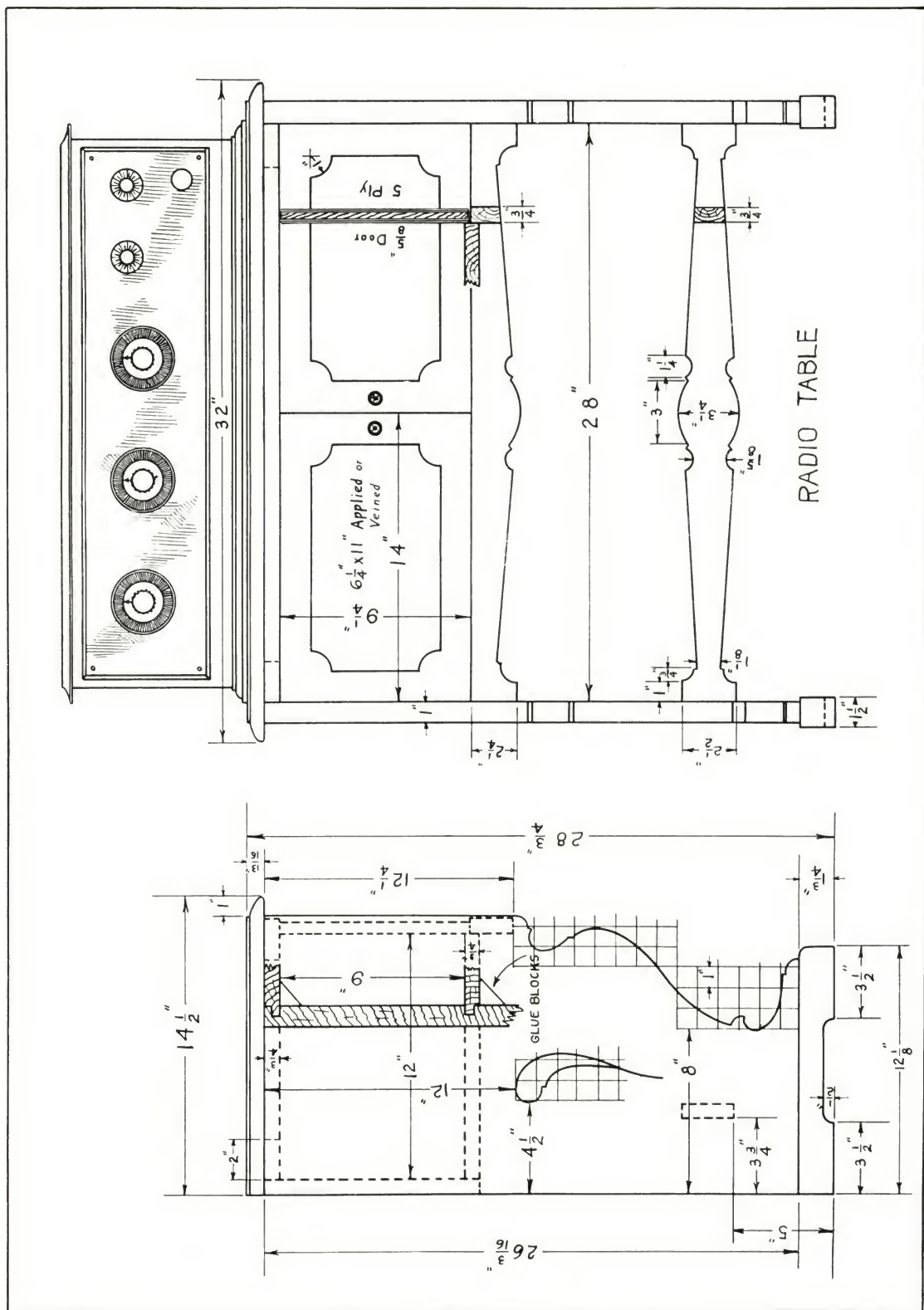
The desk shown in Figure 36 and Plate 49 is designed to fit against the wall, and it is very decidedly a "home" desk. Any desk which has a businesslike air has no place in a living room. A special desk chair is almost a necessity, if the usual overstuffed living-room furniture is used, for overstuffed chairs are poorly adapted for use with this desk.



Fig. 36. Wall Desk

CONSTRUCTION

There are no especially difficult features about the construction of this desk. Attention is called to the drawer-runner construction. The frame for this drawer runner may be doweled or mortised and tenoned. The ends of this frame are rabbeted and are set into a dado in the ends of the desk. Be sure to cut stock for two frames, one to be used above the drawers. The stretcher and the pieces under the ends of the desk may be either mortise-and-tenon or doweled joints. The drawer cases on top of the desk are joined with dado rabbet joints, and are fastened to the top with screws.



SUGGESTIONS

The veining and two-tone work on the top of this desk is especially effective, and so easily executed, that no difficulty whatever should be encountered by anyone able to do the rest of the construction. The inside portion of the veined part was stained darker than the rest of the project. The veined part of the stretcher was treated in the same manner. The moulding on the top also was stained dark. A dusty finish was applied, and this gave the lines left by the veining tool a nice sharpness which is very effective in this instance.

The two little drawers and the back rail could be left off, and the plain table could be used as a sort of console table. At any rate, it would serve very well in a room where the table must be kept against the wall.

RADIO TABLE

"Hi Ho, The Radio!" Just the table on which to keep the "set," with plenty of room for the necessary paraphernalia in the battery compartment underneath. The table shown in Figure 37 and Plate 50 is designed to fit against the wall or in any position where the back will not be visible. It is similar in design and construction to the wall desk in Figure 36.

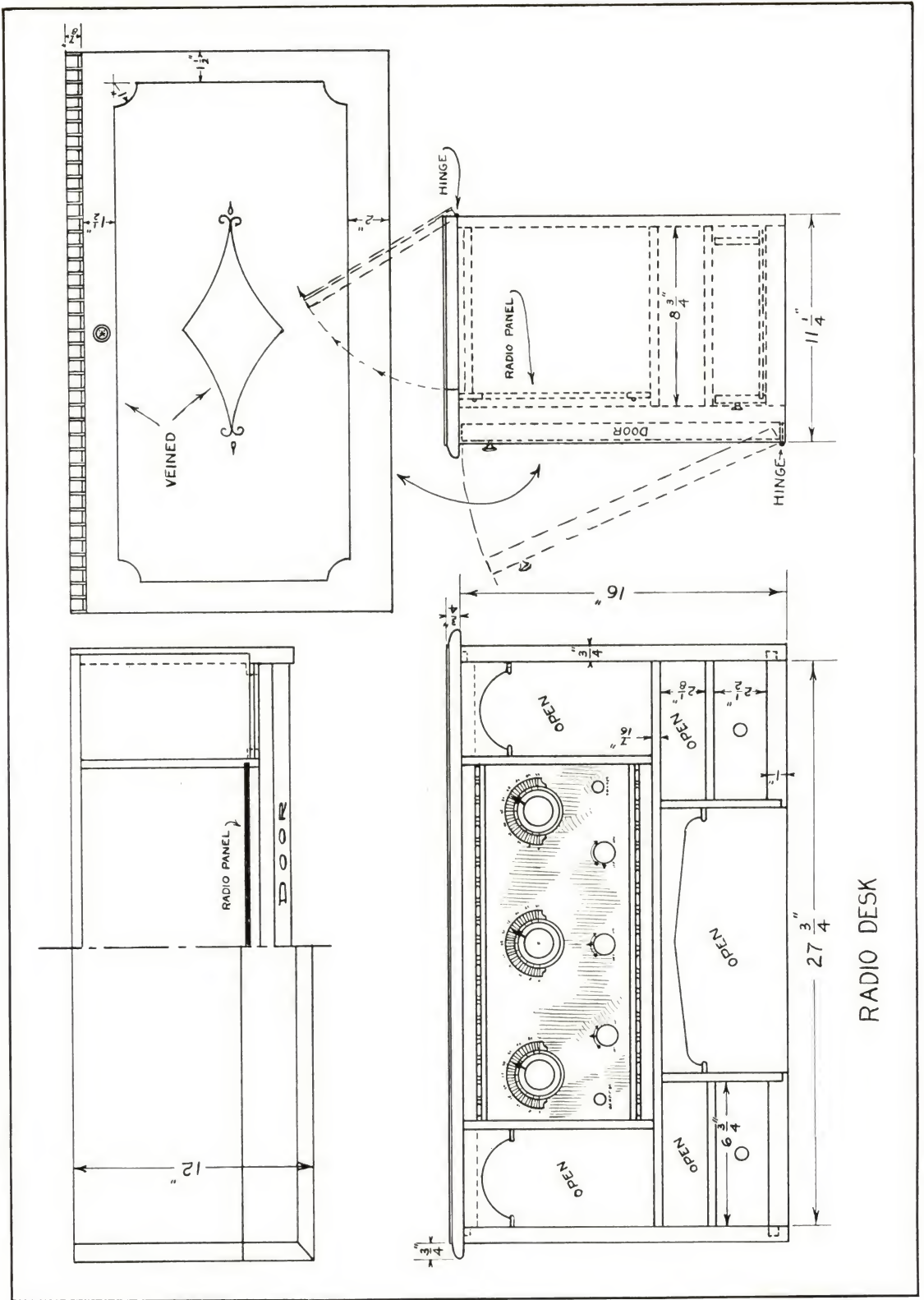
CONSTRUCTION

The front rail under the doors, and the stretcher, are mortised into the ends, and the bottom $1\frac{1}{2}$ by $1\frac{3}{4}$ -inch pieces may be doweled to the ends. The frame under the top may be mortised and tenoned, or doweled, and it



Fig. 37. Radio Table

is joined with the ends by a dado rabbet joint. The rest of the construction is clearly shown in the drawing. If a jig saw is not available, lay out the pierced design on both surfaces of the ends, and cut out with a turning saw. An expansive bit may be set to fit the upper part of the design and a hole bored there. Walnut, mahogany, or birch are suitable woods to use for this table. Use glue blocks under the top frame and under the bottom of the battery compartment, to add strength and rigidity to the structure.



RADIO DESK

SUGGESTIONS

For a small radio set, the ends may be made 2 inches narrower, without changing the design in the least, by taking 2 inches off the straight back. If a still narrower table is desired, it is advisable to bring the line of the end out a little at the bottom, and then take an equal amount off the back.

The carving on the stretcher, Figure 37, adds much to the appearance. The details of the carving were left off the drawing so that it would not appear complicated. The lower part has plenty of room for a built-in loud speaker. See this table with a radio desk superstructure in Figure 38.

RADIO DESK

Any piece of furniture that serves a dual purpose is especially welcome in our smaller homes and apartments, because of the limited room available for the necessary furniture. The advent of the radio has created another demand for space, and it was this demand which prompted the construction of the radio desk.

CONSTRUCTION

The table part of this project is exactly like that in Figure 37. The desk

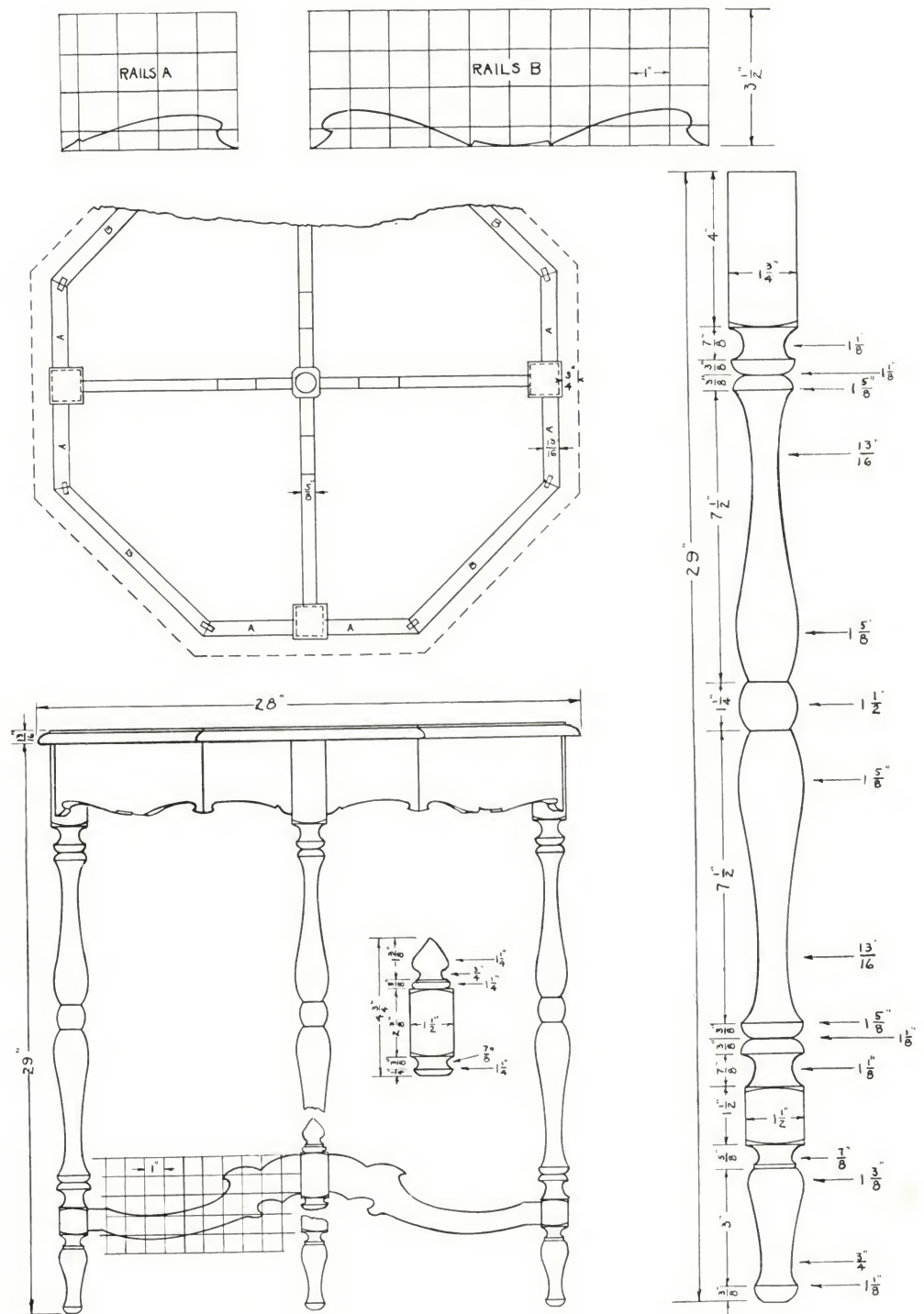


Fig. 38. Radio Desk

superstructure is a separate unit, fastened to the table with screws. The over-all dimensions are given, but the detailed dimensions of the radio compartment and the pigeon holes are omitted, because these depend on the size of the radio unit used. The moulding on the filler strips above and below the radio panel is illustrated in Figure 49, moulding Number 2. Nailed butt joints may be used for the pigeon holes, but dadoed and glued joints are preferable. The three small arches are snug fits, glued in place, and strengthened by small blocks glued on the back. The back of the desk is screwed on so that it may be removed to make the radio installation easier.

SUGGESTIONS

If desired, a loud speaker may be built into the lower part of the table. This will occupy about one half of the cabinet space, leaving the remainder for batteries or bat-



OCCASIONAL TABLE

tery eliminators. It is suggested that a grill be made of plywood to fit one half of the cabinet, so that the loud speaker may be hidden behind it. There are speakers on the market that will fit this space, and even though they are smaller than the opening, the grill with its backing of screen cloth will give the appearance of a built-in speaker. It is suggested that walnut, mahogany, or gumwood be used for this project.

OCCASIONAL TABLE

The table in Figure 39 and Plate 52 was designed as a companion piece to the console table in Figure 40. The bond between the two lies in the shape of the top and the similarity of the design of the rails. For still further harmony, the design of the rails could be made identical on the two tables. The legs and the stretcher are arranged so that four persons can sit comfortably around this table.



Fig. 39. Occasional Table

CONSTRUCTION

An accurate full-size layout of the rails, legs, and stretcher, all in their relative position, is indispensable. Note the smaller square of the leg where it meets the stretcher. Use splines to reinforce the joints in the rails, and glue blocks to aid in drawing them up properly with hand screws. When finally clamping the stretcher in place, it will buckle up unless braced down in some manner. An accurate layout and accurate cutting and fitting will save much subsequent trouble.

SUGGESTIONS

A turned stretcher would not be amiss on this table, but the one shown on the drawing is preferable. The turnings on the legs of this table are well suited to rubbing out of high lights.

Occasionally this type of table is finished in colored lacquer, but it makes a better appearance when it is finished in stain and varnish. The type of finish, however, depends on the use that the table will be put to, and the surroundings into which it is to be placed.

CONSOLE TABLE

The modern console table is a development of a very old piece of furniture which was used extensively. A great many of the old types were built as cabinets and were usually very ornate. Like all historical furniture, these tables or cabinets were influenced by the various periods or styles, but now we find them in all modern styles and sizes to harmonize with all settings.

The table shown in Figure 40 will go well with the occasional table in Figure 39. The shape of the top and the design of the rails form the bond of harmony between the two. In these two tables, which are not usually thought of as belonging to the same suite, variations in design are permissible, for they present a pleasing variation from the striking, or sometimes monotonous, resemblance which exists in furniture which has been religiously selected to "match."



Fig. 40. Console Table

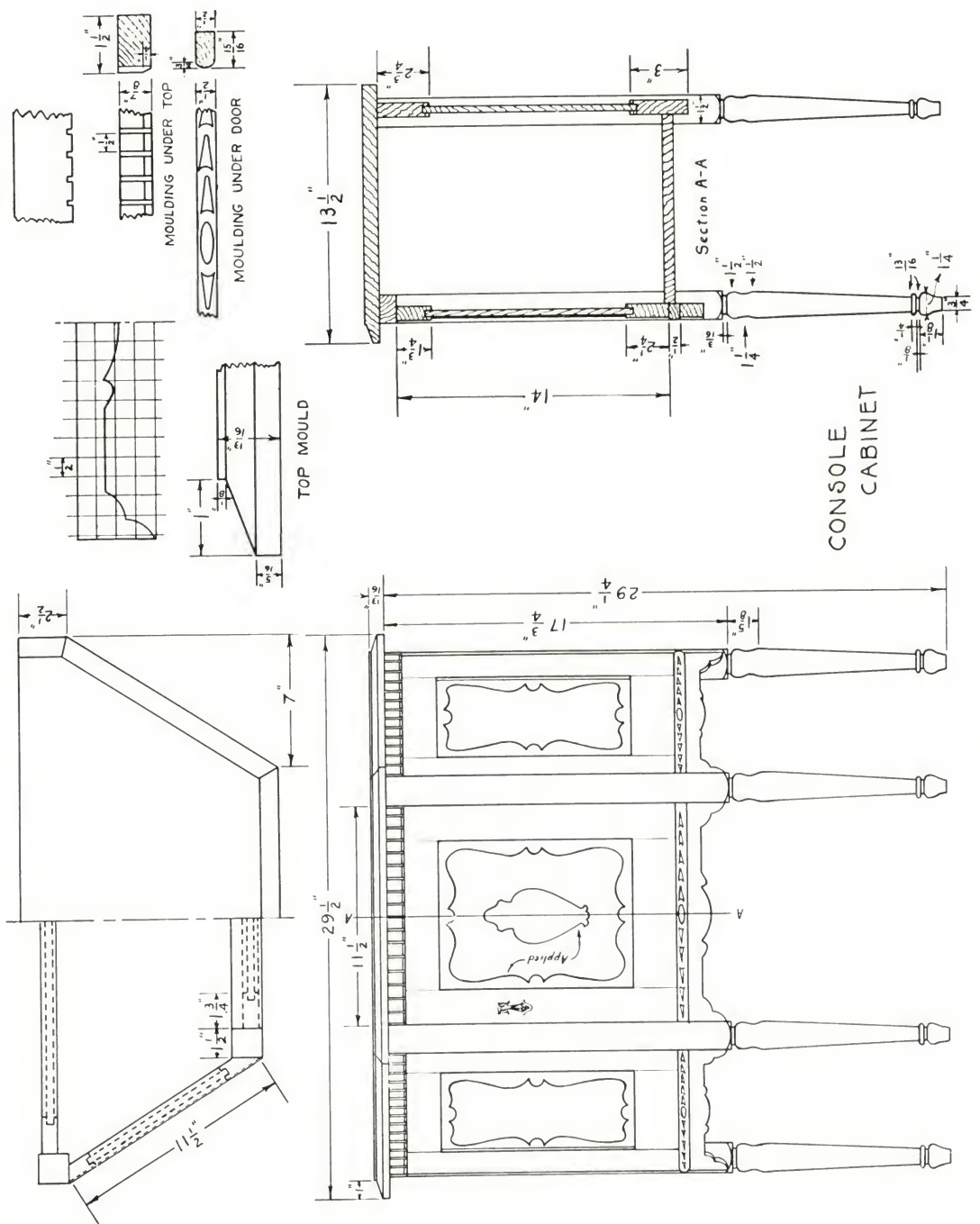
CONSTRUCTION

A full-size, accurate layout is indispensable for determining the bevels and length of rails. Note the smaller square on the lower part of the leg where it joins the stretcher. This part of the leg may be worked down to size on the jointer before turning. Splines should be used to strengthen the

joints in the rails, and glue blocks should be used to assist in drawing up the joints nicely with hand screws. The flutes in the legs were made with gouges, a large gouge being used for the upper part and a narrow gouge for the lower part.

SUGGESTIONS

The fluting may be left off if desired, or an entirely different leg may be used. The leg used on the occasional table shown in Figure 39 would serve very well. For projects of such fine design, and requiring so much work, nothing but the finer cabinet woods should be used. Your attention is called to the mirror frame designs in Figures 28 and 29 which may be used with this table.



CONSOLE
CABINET

CONSOLE CABINET

The console cabinet in Figure 41 and Plate 54 is a modern adaptation of the very old cabinets of this kind. These cabinets were commonly used in their day, and our present-day console tables have been developed from them.

CONSTRUCTION

A full-size layout of the top view is necessary, in order to facilitate the taking of the bevels for the cutting of the end panel frames. The end



Fig. 41. Console Cabinet

panel frames were grooved to receive a spline, and a corresponding groove was made in the legs. It will be found necessary to attach gluing blocks to the legs so that the clamps will draw up the joints properly. The applied enrichment of the panels was made of two pieces of thin walnut veneer glued together with the grain at right angles. The making of the dentils under the top, and the moulding near the bottom are shown in Figure 49. The bottom may be made a snug fit, and it may be held in place by glue blocks.

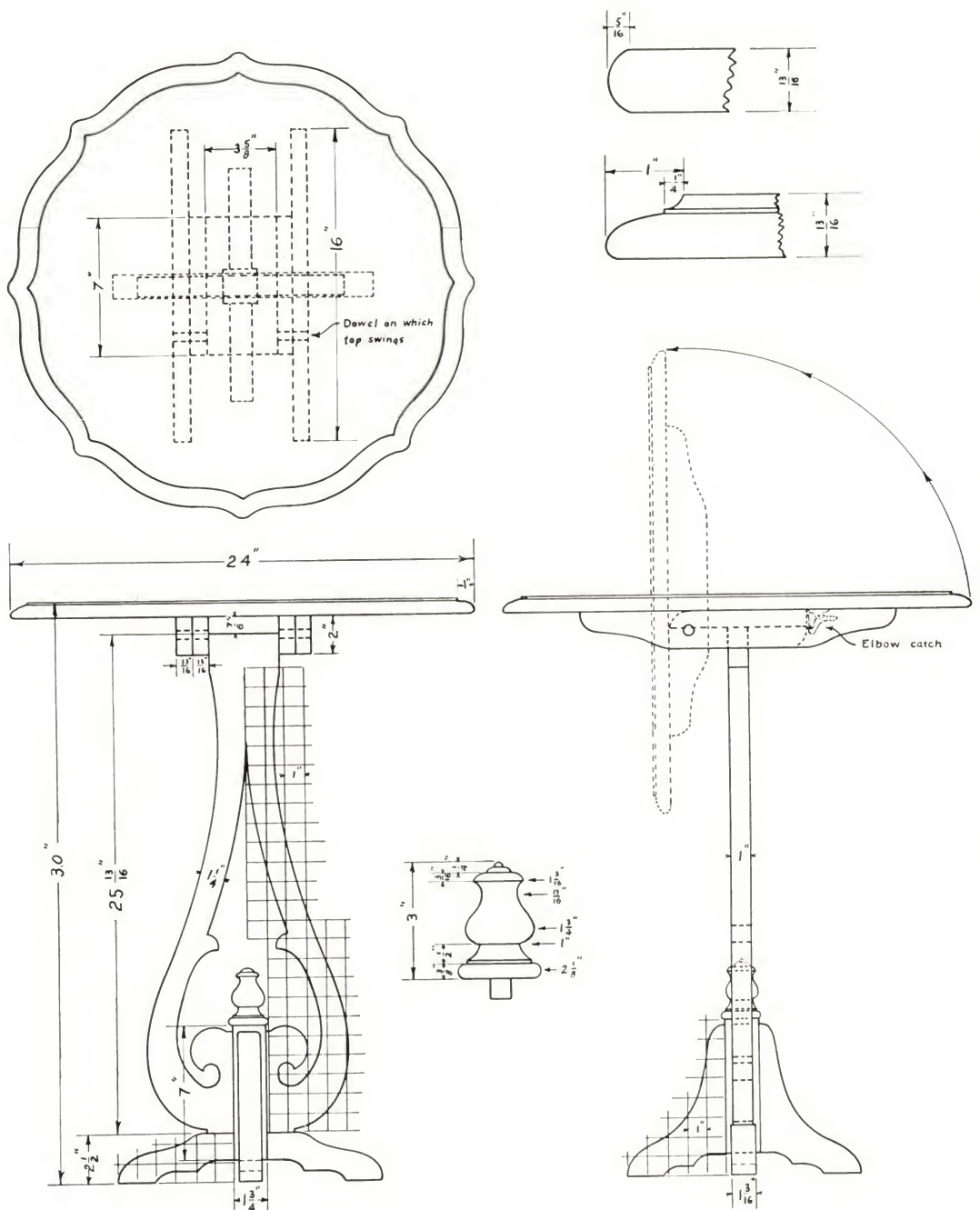
SUGGESTIONS

The panels look well when finished natural against the standard brown stain, which should be used on the rest of the table. The top mould ought to be left natural to harmonize with the panels.

A burlled walnut design applied in the center of the door panel will accentuate the center of interest. Veining and two-toning will give a similar effect.

The construction of this cabinet would be very much simplified by using five-ply panels in place of the framed panels here used, and by enriching their surface with veining and suitable two-tone work. The lower edges, of course, would have to be appropriately cut to some pleasing line.

Walnut or mahogany is best suited for this cabinet.



TILT-TOP TABLE

TILT-TOP TABLE

The tilt-top table shown in Figure 42 and Plate 55 is the most difficult to construct of any of these tables contained in this book, but the finished article is certainly worth the time spent on the construction. The shape of the top approximates that of the classical pie-crust table, and the shape of the pedestal is symbolical of the musical lyre which is always associated with

beauty and harmony. From such a background of sentimental thoughts and fancies, spring many of the beautiful furniture designs of today. Such fancies often help the designer to carry out his motive. It is not meant to infer that fancy or imagination alone will produce designs of any merit, for knowledge of good form, line, and proportion are the mediums through which the imagination is recorded, and a thorough knowledge of these is all important, otherwise the creation is very likely to be grotesque.

These side lights on design are given in several instances throughout the book, and anyone interested in this subject may profitably read the descriptions and study the photographs with some profit.



Fig. 42. Tilt-Top Table

CONSTRUCTION

This table has dowel joints, which are easily made and sufficiently strong for almost any furniture construction. The lyre shape is made of two pieces, cut to exactly the same profile, glued together at the top, and doweled and glued to the $1\frac{1}{2}$ inch square post at the bottom. The inside, as well as the outside profile, can be cut on the band saw. If no shaper is available, the top may be taken to a local mill and shaped for a nominal sum. Accuracy is the watchword, and dissatisfaction and failure the result of careless work.

SUGGESTIONS

The methods used in holding the top on this table is one of the better methods in commercial use, but a simpler method may be used if desired.

See one of the other tilt-top tables in this book for another method of holding or pivoting the top.

Some form of enrichment of the top would be desirable—either a winding circular band of flowers done in subdued colors, or a central group or cluster, done in the same manner.

TILT-TOP TABLE

Small tables are always in demand, and if not in constant use as lamp stands, plant pedestals, or for similar purposes, they are used occasionally as card or tea tables. It is because of this value in occasional emergencies that the tilt-top table design endures. The idea is not new—it has been used for centuries and has considerable sentimental value. The table illustrated in

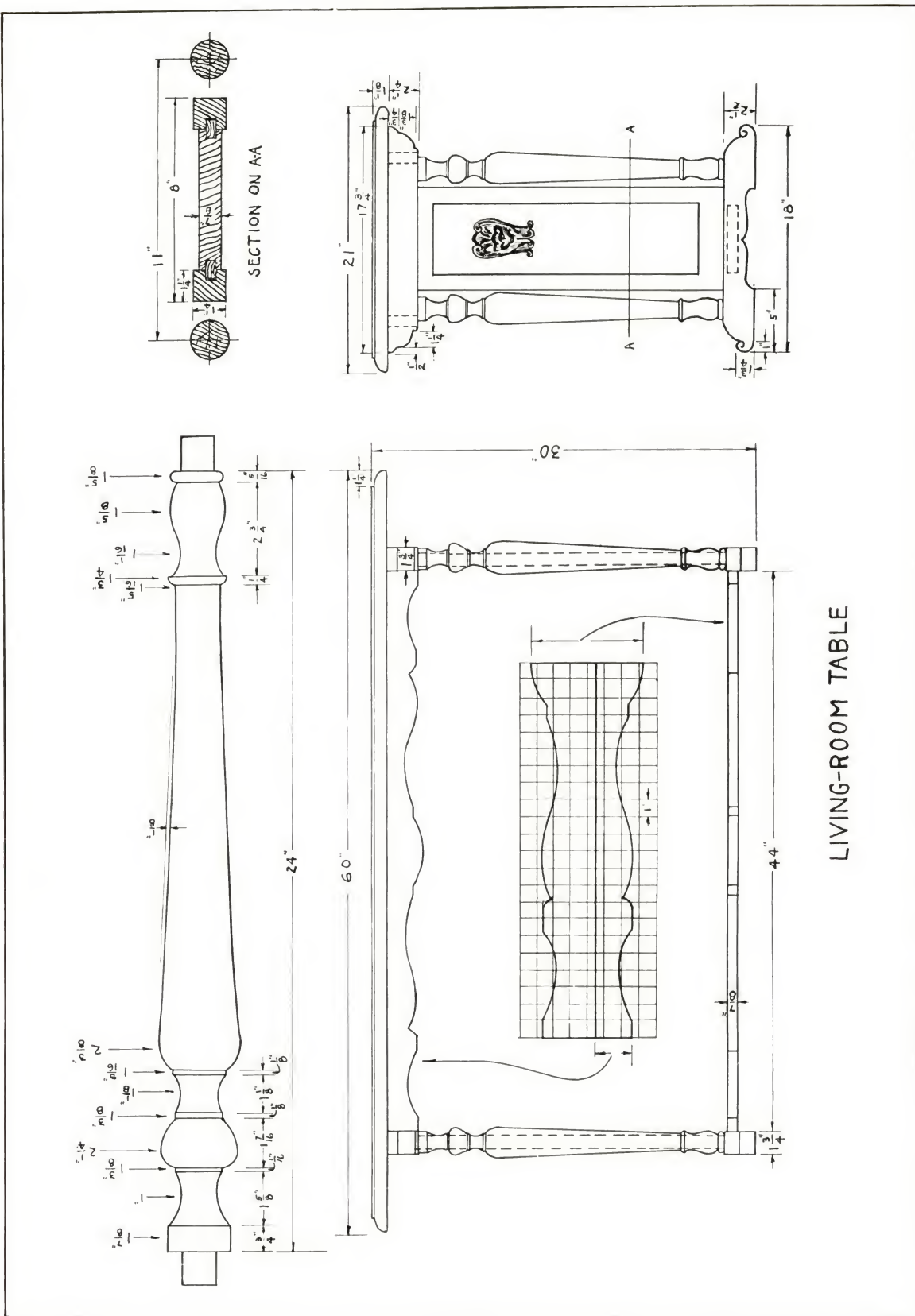
Figure 43 and Plate 56, when set against the wall with the top in a vertical position, will justify its existence in any home, even though it is never used as a card table. As seen in the illustration, the top is decorated with conventional or semiconventional flowers, and when seen in actual color, it is strikingly effective in any setting.



Fig. 43. Tilt-Top Table

CONSTRUCTION

Black walnut, mahogany, birch, or gumwood are suitable woods for this project. The shaft or pedestal of the table should be planed to the hexagonal form before turning. Lay out the hexagon on both ends and then plane to the line, or set the jointer fence to the proper angle and plane it to the required size and shape in this manner. In laying out the flutes on the bulbous part of the shaft, get the circumference of the bulb at its greatest diameter and at its least diameter by winding a narrow strip of paper around at both diameters. Then mark upon it the required number of parts. By placing the paper around again, these marks may be transferred to the wood, thus locating the position of the flutes exactly. The part just above the bulb is easily carved with a small gouge and an ordi-



LIVING-ROOM TABLE

[One Hundred Eight]

nary chisel. The three legs can be doweled into the shaft. The top should be hinged so that the table can be placed as close to the wall as possible when the top is tilted vertically. The top may also be pivoted in the manner illustrated by the tilt-top table in Figure 42. A wax finish or a rubbed varnish is recommended.

SUGGESTIONS

Since the shaft of this table is turned, the design of this part can be easily varied to suit the particular requirements or ability of the student. For the enrichment of the top, veining and two-tone work may be substituted for the painting, but no manner of two-tone work will give the happy effect that a dash of color will give. Painting the top would be a fine applied-design problem for the art department.

LIVING-ROOM TABLE

The tables in Figures 44 and 45 and Plates 57 and 58 are typical of the type of living-room table which has become so popular since the passing of the old mission library table. These tables are not so difficult to construct as the illustrations might suggest. There are no difficult joints to make, and not many small details to unduly tax the patience or perseverance of the student.



Fig. 44. Living-Room Table

CONSTRUCTION

The construction is quite evident from the drawing. Be sure to figure on tenons on the turned legs. Dowels or mortise-and-tenon joints may be used throughout. The long taper of the legs is turned slightly concave. Care should be taken to reproduce them in the same way, for a straight taper will prove unsatisfactory. The carving on the ends should be very shallow—no more than $\frac{1}{4}$ inch at its thickest part. The panels on the ends were finished natural.

SUGGESTIONS

A templet may be used to assist in getting the long concave taper on the legs true to shape. The carving may be eliminated, but some form of enrichment is desirable in its place, either veined or, possibly, applied. Remember that a vertical panel should always have its center of interest above the center. Anyone of the end tables in this book may be developed into a living-room table by broadening and lengthening the design to suit this need. This practice of appropriating another design for some other purpose, which requires it to be changed, is excellent practice for the student. It will surely develop appreciation and resourcefulness, and it may bring to light some inherent ability.

LIVING-ROOM TABLE

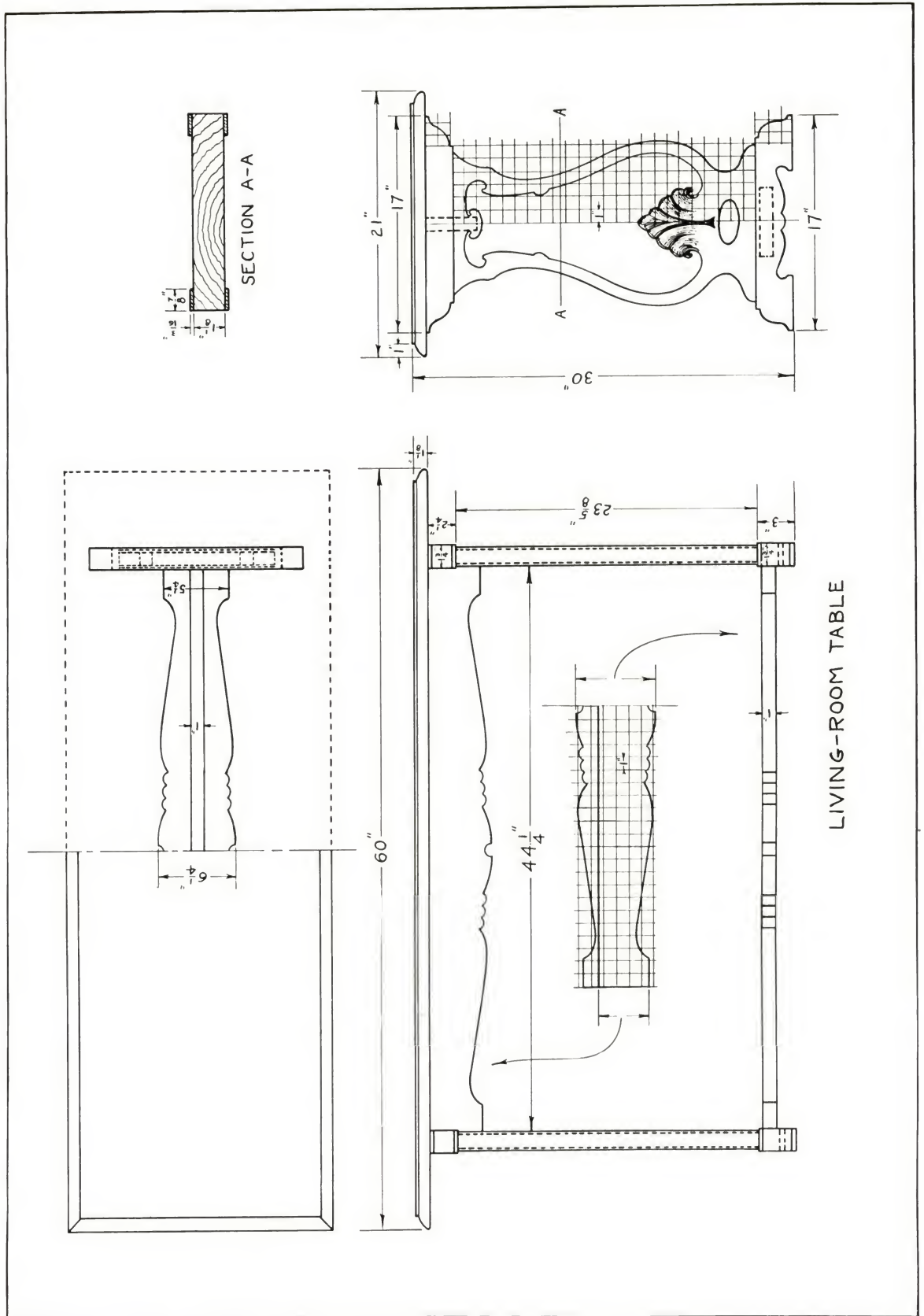
The living-room table, or davenport table, takes the place of the so-called library table which was formerly used. This type of table is far more beautiful, and fits in very well with modern living-room furniture, usually being placed in back of a davenport, in the center of the room, or against the wall.



Fig. 45. Living-Room Table

CONSTRUCTION

The joints in the lower stretcher of the table in Figure 45 and Plate 58 may be mortised and tenoned, or doweled. Those in the upper stretcher might well be dovetailed. The $1\frac{3}{4}$ -inch pieces at the top and bottom of the ends may be mortised and tenoned, or doweled. The ends were first sawed to the proper profile, and then two $\frac{3}{16}$ -inch pieces, a little wider than necessary to make the raised portion along the outside edges, were planed to make a good joint along the center of the end. The outside profile was then traced from the end onto these thin pieces, and the inside profile was then worked in from this line. This method permits the use of the band saw for cutting out both the outside and inside profiles. After they have been sawed out, finish the inside edge completely. Then place the two pieces, joined



LIVING-ROOM TABLE

edges together, on the ends in exactly the position that they will have when glued. Hold them in place with two or three brads driven in part way. The pieces are now ready for gluing. Remove the strips, apply a little thin glue, and place them in position, being careful that the brads fit into the original holes, in the ends. Place strips between the clamps to equalize and distribute the pressure, and when the glue is dry remove the clamps and finish the outside edge of the ends and the applied strips at the same time. The carving is very similar to that used on the lower part of the pedestal, Figure 46, which is illustrated in detail on Plate 65.

SUGGESTIONS

Walnut or mahogany are best suited for this project. The carving at the bottom may be eliminated, and an appropriate design substituted for it. It is recommended that the sunken panel be left natural; also the small ellipse under the carving. A shellac and wax finish will give this table a fine soft luster. (See "shellac and wax finish," under wood finishing.)

FRENCH RENAISSANCE PEDESTAL

The pedestal, Figure 46 and Plate 59, is an adaptation of the early French pieces of this nature which were in such general use in that early day. In those days it was customary, much more so than now, to place busts and figures on pedestals of rare beauty. This pedestal is not overdone from the standpoint of design, and it will not look like a curio or appear out of place in any setting.

CONSTRUCTION

Walnut or mahogany are best suited for this project. The shaft is especially simple in construction, nailed and glued butt joints being used. The joints and nails are covered by corner strips. The cove on the corner strips can be made with a plow with a cove or fluting cutter. The construction of the base is evident from the drawing. Splines may be used in place of the dowels, if desired. The various parts, top, neck, shaft, and base, are all doweled together. To present more doweling surface, blocks were glued to the inside of the shaft at top and bottom. The mouldings under the neck and under the leaf at the bottom, which resemble a quarter round, may be mitered or may be moulded on a solid piece, if desired. Care must be taken to smooth the end grain perfectly. See Plate 65 for carving designs.

SUGGESTIONS

The neck and the corresponding part of the base may be moulded and mitered together, if desired, but the construction indicated in the drawing has the advantage of insuring permanently tight joints. By mitering the blocks under the base, no end grain will be visible there. The leaf at the bottom had better be fit before carving. It is no thicker than the corner strips, and is easy to carve, but exceedingly effective in its application. The shell at the top is $\frac{3}{8}$ inch thick at its thickest part, and it tapers down to $\frac{1}{8}$ inch.



Fig. 46. French Renaissance Pedestal

CANDLESTICK (TURNED AND CARVED)

Figure 47 and Plate 60 illustrate a project which is an excellent example of how seemingly intricate carvings of this nature are built up. Candlesticks are usually used in pairs, but this one, because of its imposing size and fine lines, will stand alone, if time will not permit the making of two.

CONSTRUCTION

The turned part is comparatively simple to make. Remember to leave a dowel on the lower end, for fastening the shaft into the base. A study of the drawing, Plate 60, will describe and illustrate the construction of the base more clearly than words. The sawing of the inside and outside profiles of the carving blanks shows how carvings are blanked out. In sawing the outside profiles, after the blanks are glued in place, the base must be blocked up so that the bottom of it is at right angles to the bandsaw table. After the sawing on the base is completed in this manner, there will be an incentive to carve, for the very profile as it then appears, suggests very strongly the finished design. See Plate 65 for a reproduction of a pencil drawing of the carving used on the base.

SUGGESTIONS

The beginner will do well to make a sample carving in either soft pine or poplar, before beginning work on the base. He then can experiment without fear of ruining his work, and this sample carving is a good thing for a novice, for it gives him confidence in his ability, and promotes deliberate action which is quite essential in artistic carving. If he were to begin work without this preliminary carving, he would be hampered by the fear of spoiling his work, and the result would probably be discouraging. This particular carving problem does not bewilder a beginner as some carvings do, for the blanks are very suggestive and they lead one on. This is especially true after a start is made. In wood carving, it seems that the best results are obtained when one does not follow his sketch or drawing too closely. One must be guided in a general way by the drawing, but the details and refinements must be worked out in the wood. Shadows and contrasts of surfaces may be best studied in this way.



Fig. 47. Candlestick

VEINED, APPLIED, OR PIERCED DESIGNS

The designs on Plates 61, 62, 63, and 65 are typical for the purpose above-mentioned. Some of them might be used in either applied, veined, or pierced application, while others are suitable for only one or two of these applications. For example, some of these designs cannot be used in pierced work, because of the small projections which are very likely to be broken off in sawing or in smoothing the cut. Even though they do not break while being cut, they appear structurally weak and are, therefore, unsatisfactory. Generally what is suitable for veining also is good for applying.

There is no limit to the designs that may be developed for this purpose, but in selecting or developing a design, its use and application must be considered. The design selected should follow, in a general way, the profile or lines of the surface enriched, although its minor parts may differ greatly. If veined or applied, the finish should not be sharply contrasted with the background. It should harmonize with the background, and yet stand out in profile and tone. Pierced designs should follow, in a general way, the profile of the surface enriched. They must not weaken or appear to weaken the structure. Utility should never be sacrificed for beauty.

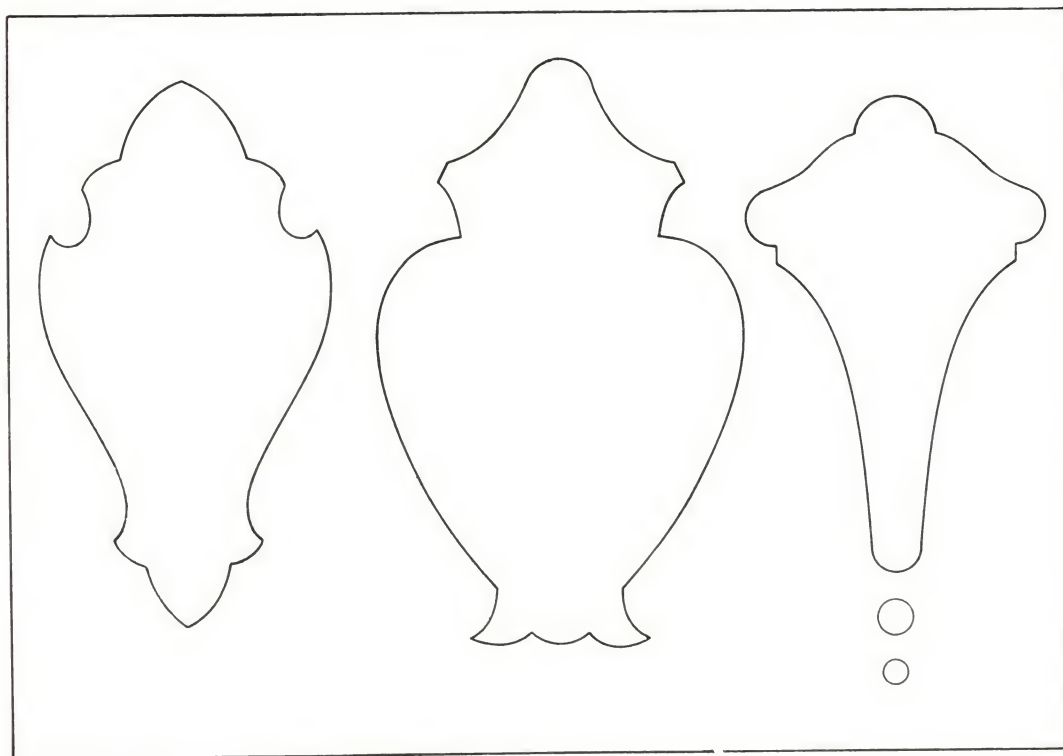


Plate 61

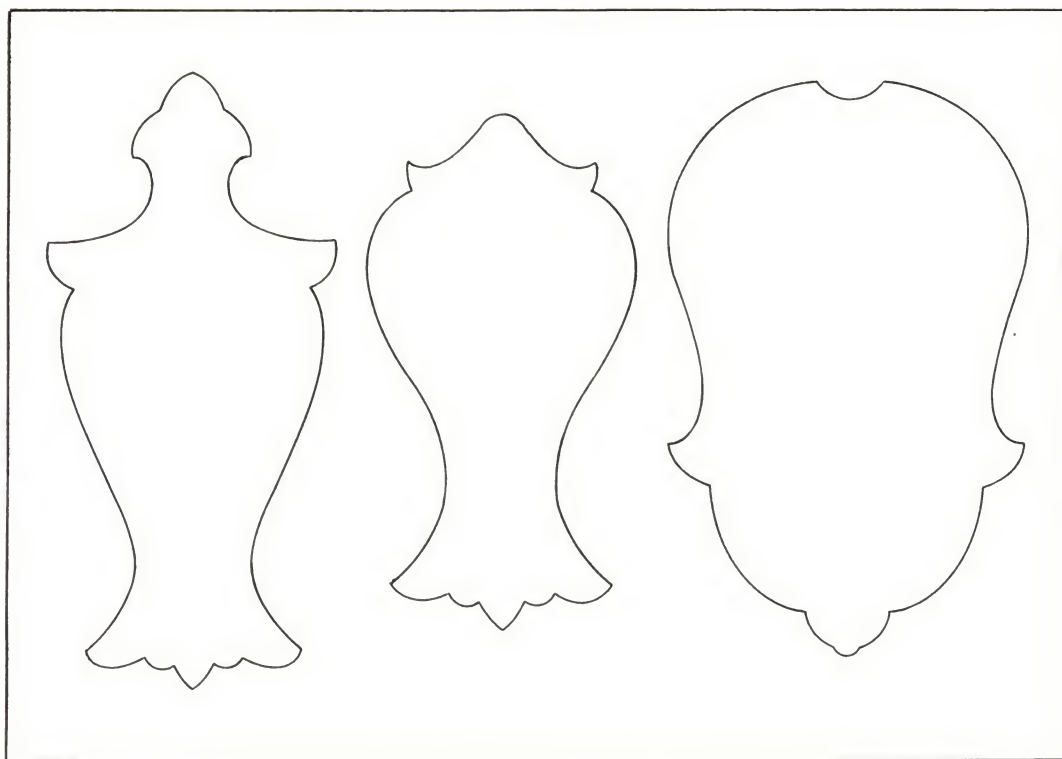


Plate 62

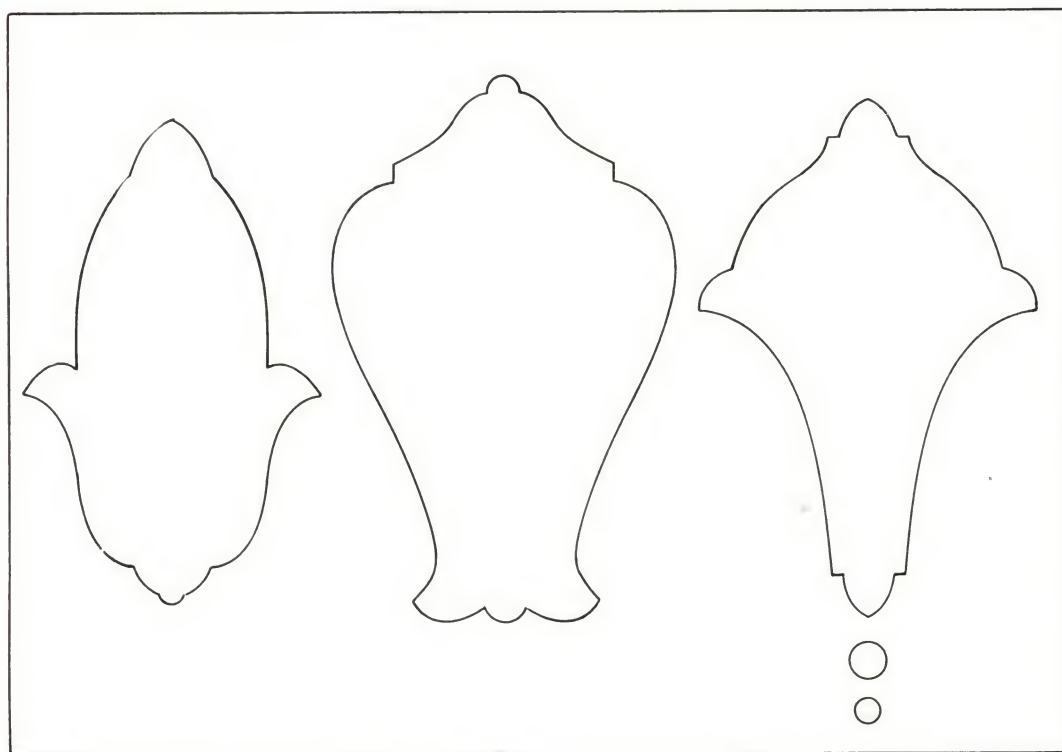


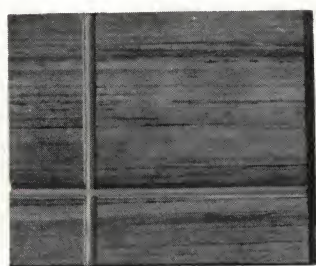
Plate 63

A rectangular mirror held perpendicular to the paper with its edges either to the right or left of the center of the design will show how the design will look if made narrower or wider. A mirror used in this way will prove very helpful in originating new designs.

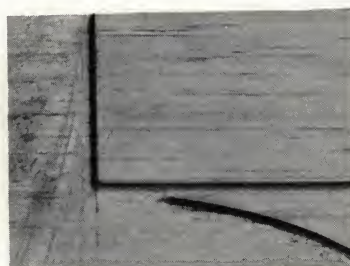
STEPS IN MAKING TABLE-TOP MOULDS

Figure 48 shows the method of making the style of table-top mould which is used on so many of the tables in this book. This mould is appropriate for almost any table, and it is very easily made. A circular saw was used in operations one and two, and a smooth plane was used in operation three. Sandpaper will remove the arrises left by the plane. This finishes the moulding which is illustrated in operation four.

If no circular saw is available, a rabbet plane may be used for operations one and two. These two operations will then be made at the same time. There are, of course, other types of moulds which can be made by hand, but this is probably the most simple to make, considering also the appearance. A bull-nose rabbet plane is well suited to the final shaping of this mould, and it is especially adapted to working up close to the corners all around the top surface. However, it is not indispensable, for the moulding may be made without the help of this tool.



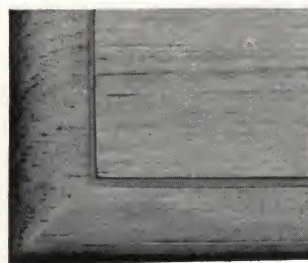
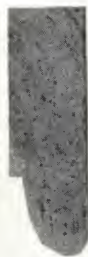
Operation 1



Operation 2



Operation 3



Operation 4

Fig. 48. Steps in Making Table-Top Moulds

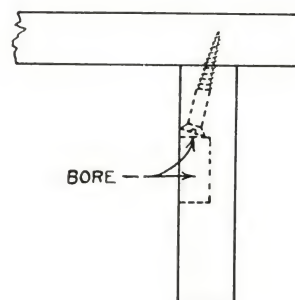
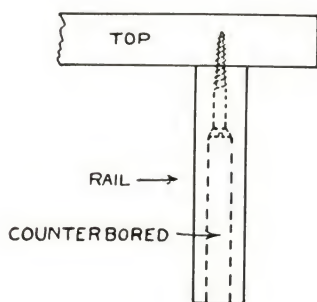
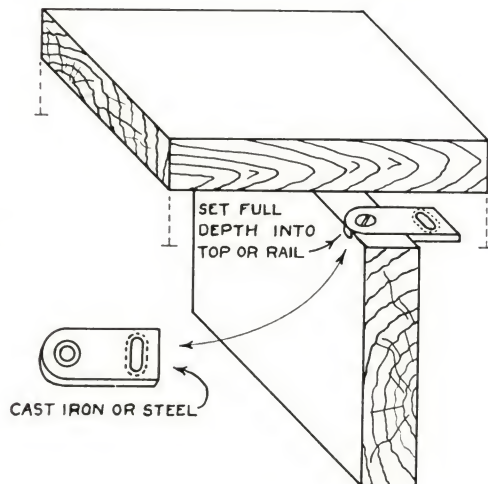
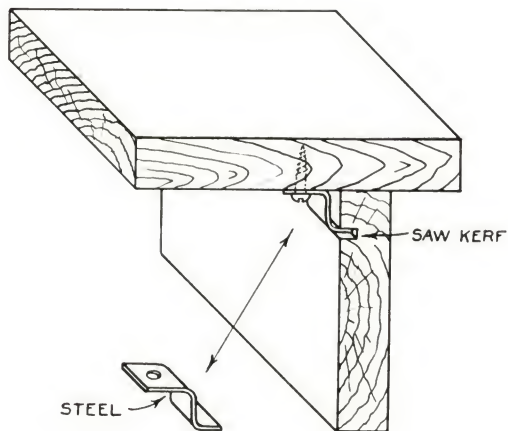
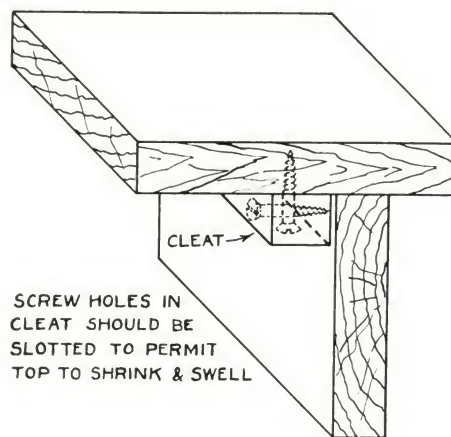
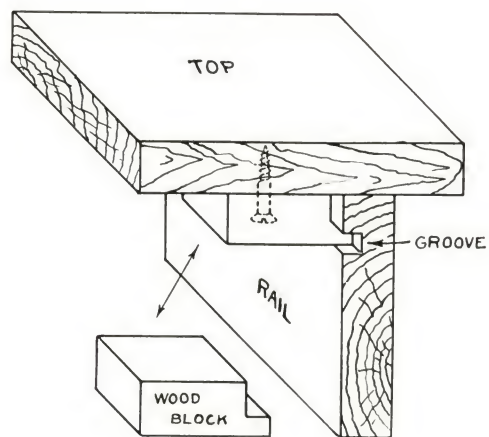


TABLE-TOP FASTENINGS

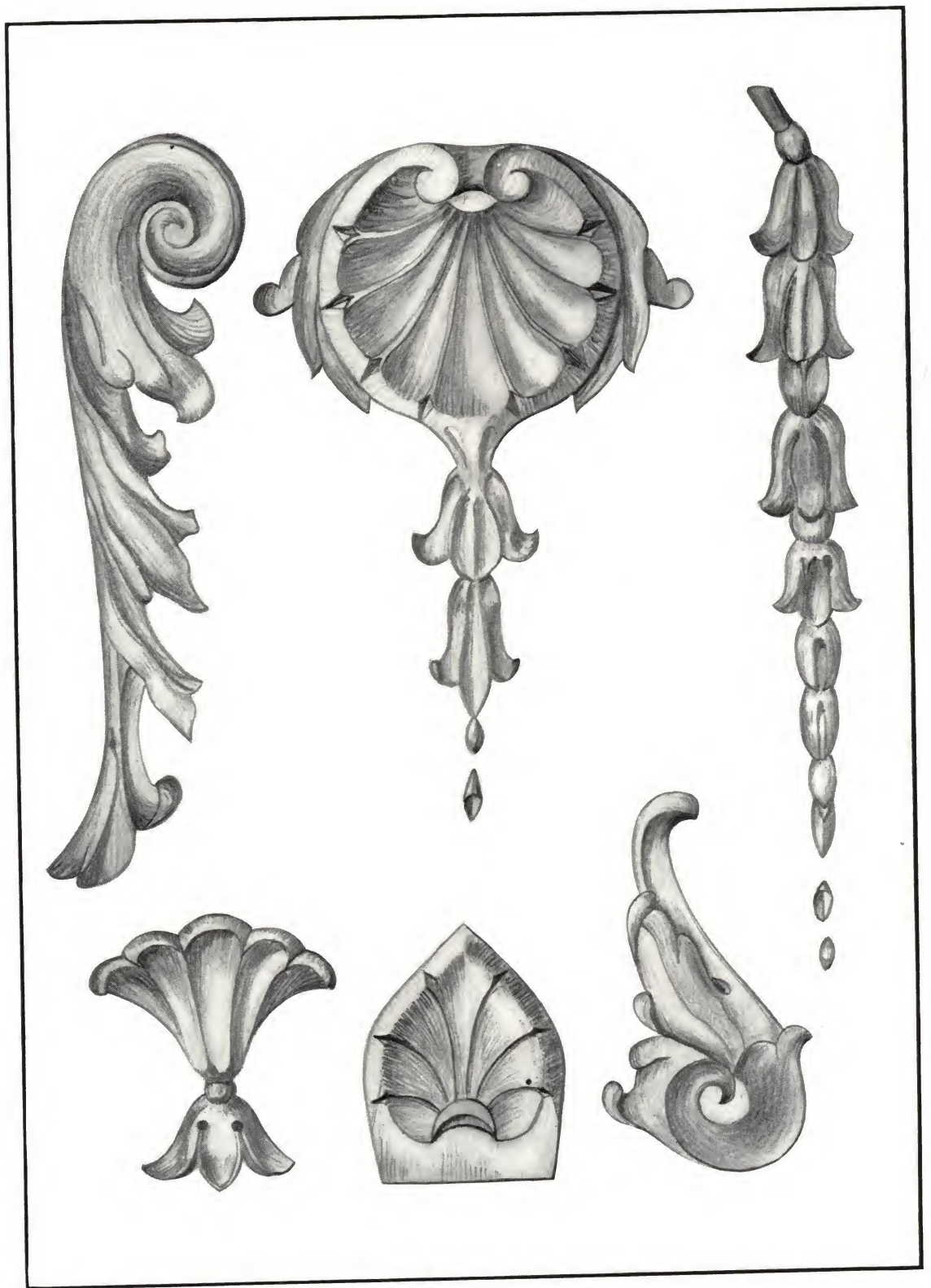


Plate 65. Carving Designs for Figs. 28, 46, and 47

HANDMADE MOULDINGS

It often is very difficult, if not impossible, to obtain mouldings in the small quantities which are usually required in school shops, and it is partly for this reason that some mouldings were included in this book. The real justification for their insertion, however, is not their intrinsic value, but the potent educational possibilities which this type of work offers.

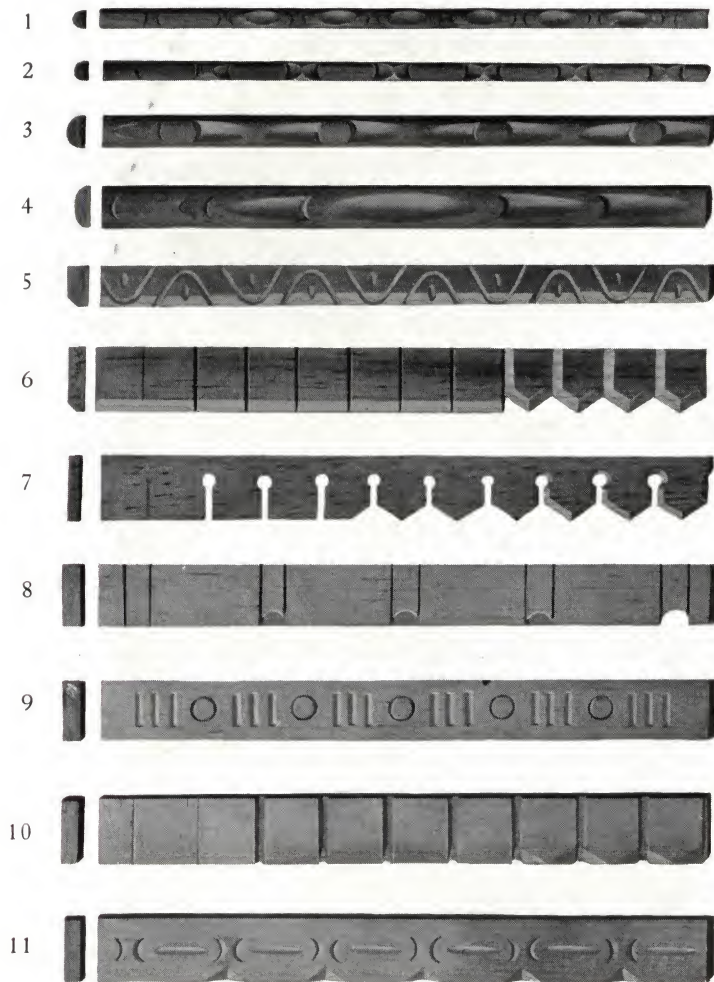


Fig. 49. Handmade Mouldings

The mouldings shown in Figure 49 illustrate very graphically and progressively some elementary principles of design, namely—the grouping of simple lines, forms, or surfaces, in suitable and pleasing combinations. On several of these sample mouldings, the sequential operations are very clearly

illustrated, beginning at the left end of the moulding and continuing over to the right. In many cases, the intermediate stages of development of such mouldings form very suitable mouldings in themselves. At any rate, the development illustrates very definitely the importance of these little details which form an integral part of the whole.

These mouldings were made by hand, with the exception of Number 10, which was made with a circular saw. Number 6 is similar to Number 10 and is handmade, a backsaw being used instead of a circular saw. Some of these mouldings are used on projects in this book, others might have been used, but were left off so as not to make the work appear too difficult.

WOOD FINISHING

A good finish cannot be purchased in a can or bottle. Students and others not well informed on finishing, seem to infer from reading the labels that a good finish will be obtained by the simple act of brushing on the contents of the can or bottle, and otherwise following the directions in a perfunctory manner. As a result, if they are not very much disappointed with the outcome they lack appreciation of a good finish, or they despair of ever being able to produce a finish which compares with that found on "store" furniture. The "store" product seems to be the students' criterion for the comparison of finishes. Finishes which compare very favorably with the best produced by the trade can and should be produced by students in school shops.

Basically, three things or conditions are essential for good finishing:

1. The project to be finished must be properly prepared for a finish. That is, it must be free of all tool marks; it must be smooth and free of all scratchy and cross-grain sandpapering.
2. The finishing material itself must be suited for the kind and character of the wood and the use to which the project will be put.
3. The finishing material must be properly applied and applied under the right conditions and sequence.

The third condition is very often covered by the directions on the label on finishing materials, but since no good finish can be purchased in a can or bottle (only materials for the good finish are obtainable in such containers) a knowledge, and especially an appreciation, of the conditions and technic of application of these materials is all-important for success in this line. As in every other endeavor, practice in finishing also develops the ability to produce better finishes.

The authors hope, by what has been said so far on the subject of wood finishing, to dispel any doubt as to the possibility of obtaining good wood-finishing results in school shops. Before passing on to the specific finishes, a word about the physical finishing equipment other than the stain, shellac, varnish, etc., used is pertinent. The suggestions which follow and those listed under the various finish headings are those things which do not come in the can, but which are absolutely essential for good finishing. In the first place, a room separated from the shop by a tight partition and door is very desirable for finishing. In fact, it is exceedingly difficult to produce certain finishes, such as varnish finishes, in the open shop with its dust. Some finishes such as wax finishes, and even shellac finishes may be applied quite successfully without the convenience of a separate room. Brushes and contain-

ers must be kept clean. When not in use they should be covered or put away where they will not collect dust.

Containers used for shellac, varnish, enamels, paints, and lacquers, in spite of all preventive effort, will collect particles of dust and grit. However, they may be cleaned easily if left in a strong solution of lye and water for a few days and then rinsed in clear water. Use a five- or six-gallon crock for the lye solution. Two cans of lye added to the five gallons of water will keep your containers clean for some time.

Don't forget that your clothes must also be free from dust if good work is to be obtained. The brushes when not in use should be suspended in a solvent; turpentine for varnish brushes, and alcohol for shellac brushes. One way to do this is to drill a small hole through the handle, run a wire through this, and then suspend the brush in the liquid so the ferrule is just immersed. Brushes used for oil stains do not require so much care but they should not be allowed to become hard and stiff. Before using a brush that has been stored in turpentine, brush out all excess turpentine to guard against undue dilution of the varnish or stain used. If this precaution is not observed, the first few strokes of the varnishing will be thinned too much. And in the case of the stain, if the brush is not worked into the stain before use, light spots may result because of the diluted stain in the first stroke or two. Waste or rags which leave lint are unsatisfactory for use in wood finishing. As a precaution against fire from the spontaneous combustion of oily rags, a can with a self-closing cover should be provided for the disposal of all oily rags.

Unfortunately there are finishing materials on the market with which it is absolutely impossible to do a creditable job. The use of such materials has no doubt resulted in much discouragement. Shun all preparations that contain stain, shellac, varnish, or what not, all in one marvelous mixture.

The first consideration in finishing a project is the stain, unless a natural finish is desired. There are three principal kinds of stain namely, water stain, oil stain, and spirit stain.

WATER STAIN

Water soluble stains are furnished in powder form in any desirable shade. They are perfectly soluble in water, penetrate deeply into the fiber of the wood, flow on evenly, and are much less likely to fade than spirit or oil stains. The objection to water stains is that they raise the grain of the wood. This may be avoided by first sponging the wood with clear, lukewarm water. After the wood is dry, sand smooth with fine sandpaper to remove the roughened grain before applying stain. Water stains should be applied with a large brush and considerable stain in the brush. The color of water stain should

be judged when it is wet. If a darker shade is desired, apply a second coat after the first is dry.

OIL STAIN

Oil stains are suitable for such finishes as golden oak, early English, and weathered oak. Since they save considerable labor, they are used for furniture that must be sold at the lowest possible price. On walnut, mahogany, birch, or gumwood the effects are not so clear as those produced by water stains.

SPIRIT STAIN

Spirit stains are not desirable because of their fading and of the muddy effects produced. They are also difficult to apply without showing laps or streaks and are used by the large furniture manufacturers for shading purposes only.

SHELLAC AND WAX FINISH

A shellac finish is one of the modern finishes which may be applied and completely finished in a comparatively short time. It is a very beautiful finish and one which can be successfully applied in shops not having a separate dust-proof finishing room. After the project has been stained, and the stain has dried, a thin coat of shellac should be brushed on. The most common difficulty encountered is that of using the shellac too thick. It should be reduced by using three parts of pure 4-lb. shellac to two parts alcohol. The smaller amount of alcohol in thick shellac evaporates so quickly that the shellac sets almost under the brush and the inevitable result will be ugly laps and patches. Since shellac sets so rapidly, the beginner thinks it is "dry" and he, therefore, usually applies one coat after another in rapid succession. Such a procedure will also cause laps, for the first coat of shellac has only set and the succeeding coats will cut or dissolve the first coat and the result will be streaks, laps, and blotches.

Five or six hours should be allowed for shellac to dry. The first coat of shellac will seal and harden the surface and close the pores in all close-grained wood.

Before giving the project a second coat of shellac, sandpaper very lightly and carefully with very fine sandpaper. Then dust the project and apply a second coat. When this has dried, sandpaper as before. Two coats are necessary on hardwood, but three coats will give a better finish.

Whether a two- or three-coat job is done, it is very important to sand the last coat very carefully with 6/0 sandpaper. This removes all of the bright gloss left by the shellac, preparatory to the waxing which is a part of this finish. If this precaution is not observed, a patchy effect will result.

The wax, either in liquid or paste form, should be thinly applied and when it flats, it should be rubbed briskly with a soft rag to produce the de-

sired luster. Wax may be had in paste form in its natural light color or in black. The black is best suited for dark finishes because it will not show in corners like the light wax.

WOOD FILLING

When a smooth surface is desired, the pores of all open-grained woods should be filled. Filling is always necessary in a varnish finish on open-grained wood. Paste filler should be reduced with benzine, about ten pounds of filler to one gallon of benzine. Best results are obtained when filler is applied with a brush, brushing across the grain of the wood to work the filler into the pores of the wood.

Just as soon as the filler begins to flat on the surface to which it has been applied, it should be cleaned off with rags by first rubbing crosswise of the grain of the wood to remove the surplus filler. Then it should be rubbed in the direction of the grain with clean rags to remove all of the filler from the surface. If the filler is not cleaned off properly, a cloudy effect will appear when the shellac and varnish is applied. Use a wood splinter covered with a rag to clean the corners. The filler should be allowed to dry in the pores at least 24 hours before coating with shellac.

Filler may be purchased in its natural shade and colored to produce shades desired. For coloring fillers, use colors ground in oil.

LACQUER FINISH

The lacquer referred to here is that used by factories for finishing furniture. On a commercial scale, lacquer is applied with an air brush because it dries so rapidly, and also because of the economy of time in applying the finish in this way.

For the past few years manufacturers have been constantly improving their brushing lacquers and now there are a number on the market which can be applied very successfully with the brush. Some lacquers contain a solvent similar in action to varnish and paint remover; therefore, it is obvious that they should never be applied over paint or varnish containing linseed oil. Some manufacturers offer a special sealer for the purpose of sealing the surface against this action.

If a transparent finish is desired, stain the work with water stain and fill if necessary. Apply a sealing coat of shellac after the filler is dry. Oil stain is unsatisfactory because it will bleed through the lacquer. Follow the manufacturer's directions for applying the lacquer. In general, flow the lacquer on with a soft brush and do not brush twice over the same place. Complete the application as quickly as possible to prevent laps and dragging

[*One Hundred Twenty-eight*]

of the surface. Allow from two to six hours for drying between coats. It is not necessary to sand between coats.

To apply colored lacquer, size the bare wood with shellac, sand and apply the lacquer according to the manufacturer's directions. Two coats of color lacquer are usually sufficient.

To rub down the final coat of lacquer proceed as in rubbing varnish (see "Rubbing Varnish, Enamel, and Lacquer"), allowing the final coat to dry at least 48 hours. Brushes used in lacquer, may be cleaned in lacquer thinner, a preparation used for thinning lacquers.

VARNISH FINISH

Varnish, as we know it today, is essentially an American product having been almost entirely developed in this country.

A satisfactory varnish finish cannot be applied over a porous or poorly prepared surface. All open-grained woods must be filled. (See "Wood Filling.") All work, whether filled or not, must be shellaced and then evenly sanded and carefully dusted off before varnishing. Pay particular attention to corners and joints; see that no particles of dirt are left.

The work is now ready for the first coat of varnish. Use a high-grade rubbing varnish and a good brush. Apply a full coat, and do not attempt to brush out the varnish too much.

After a panel is varnished flow it out, that is, work the brush across the grain and finish brushing in the direction of the grain. Allow this coat to dry two days, then carefully sand using 5/0 or 6/0 garnet finishing paper. Sand crosswise of the grain on the ends, and then sand in the direction of the grain, carefully removing all sandpaper marks. Be very careful that the edges and corners are not sanded through, and do not use too much pressure.

After dusting carefully, the second coat may be applied. Proceed same as for the first coat. Two coats are usually sufficient. The last coat is not sanded, but left to dry from three to five days, when it may be rubbed with pumice stone and oil to a smooth satin finish. (See "Rubbing Varnish, Enamel, and Lacquer.")

FLAT VARNISH

There are on the market flat-drying varnishes that do not require rubbing. These varnishes are sold under various trade names and are used where a dull finish is wanted at little expense. They are also used on the cheaper grades of furniture, and on the inside of cabinets and drawers.

Flat varnishes are not as durable and will not stand the wear as well as glossy varnishes.

For best results, they are applied over a coat of glossy varnish.

RUBBING VARNISH, ENAMEL, AND LACQUER

The materials necessary for rubbing are pumice stone or "wet or dry" sandpaper both of which are abrasives, and water or oil which serve as lubricants, and a burlap or felt pad about $2\frac{1}{2}$ by $3\frac{1}{2}$ inches.

The oil used for rubbing (a pale paraffine oil) is known to the trade as "rubbing oil," and may be had from any firm dealing in paints and wood-finishing supplies.

Pumice stone is graded as follows: Numbers 1, $\frac{1}{2}$, $0\frac{1}{2}$, F, 2/F, 3/F, 4/F. Number 1 is the coarsest, about like sugar, and Number 4/F is the finest, almost like flour. Numbers 2/F and 3/F are most commonly used, as they are fine enough not to scratch and yet coarse enough so they will cut well.

Rubbing with pumice and water will give the work a flat, dull appearance, while rubbing with oil will give the work a pleasing satin sheen bringing out the beauty of the wood to its fullest extent.

After the piece to be rubbed has dried from three to five days, proceed by sprinkling the part to be rubbed with Number 3/F pumice stone. The burlap pad or felt pad is then dipped in oil and rubbed over the top until the pumice and oil forms a thin paste.

Remember that all rubbing is to be done with the grain of the wood. Bear down firmly on the pad using long, steady, even strokes, and work methodically from one side to the other. Keep plenty of oil on the work and do not let the pumice become dry. Caution: Do not bear down too heavily when rubbing, or the resultant heat caused by the excessive friction will soften the varnish.

Examine the work from time to time by cleaning off a little of the rubbed surface, and when it appears smooth, and all the little dust specks in the varnish have been rubbed out, the work should be cleaned with cheese cloth or waste to remove the surplus oil, and then should be gone over with another clean piece of cloth until the work is dry and clean.

Corners should be cleaned by means of a wood splinter covered with a rag. This ends the rubbing process, and most finishers today leave the work at this point.

If a polished surface is desired, use rottenstone and polish made for the purpose. This is applied with waste, and is rubbed the same as the pumice stone. The more rubbing, the higher the polish. Clean as before with waste or cheese cloth.

[*One Hundred Thirty*]

TWO-TONE FINISH

This finish is named from the fact that some parts of the piece are finished in light shades, while others are given darker shades. For instance, a table top may have a dark band about two or three inches wide around the outside, while the rest is finished in the usual color. The dark and light parts should be separated by a line cut with a veining tool, so as to facilitate staining. In general, the whole top may be stained with the regular strength stain, and when dry, the dark parts are restained with a stronger stain. The work may then be finished with varnish, or shellac and wax as desired. Many beautiful effects are obtained with this process.

Water stains are especially well adapted for two-tone work because they are easily lightened or darkened in tone and they may be applied one coat over another for a darker effect. However, the first coat must be dry before the second is applied. When an oil stain is used, two coats will not darken the wood any more than one coat, because the wood has absorbed enough oil from the first coat to prevent its absorbing any more from the second coat; consequently the color remains the same.

ANTIQUE WALNUT

This is a beautiful novelty finish for walnut. It was originally designed to imitate an antique piece of furniture in which the pores of the wood showed gray because of the accumulated dust.

The finish is produced by first staining the wood. Then two coats of thin shellac are applied, after which the job is sanded. The pores are then filled and the job waxed, all in one operation, by using a mixture of rottenstone and paste wax. This mixture is rubbed on or brushed on and then polished as usual for a waxed finish.

Zinc white in powder form is used sometimes instead of rottenstone. Still another effect may be obtained by mixing the two, zinc white and rottenstone, with the wax.

These finishes are variously known as antique walnut, dusty walnut, Italian walnut, renaissance walnut, etc.

ENAMEL FINISH

Furniture to be enameled should be made of close-grained wood. Birch and gumwood are usually used.

A thin coat of shellac is sometimes applied to stop the suction, before the undercoat is put on.

White lead thinned with turpentine makes an excellent undercoat because it has great covering capacities. Two coats of undercoat are usually suffi-

[*One Hundred Thirty-One*]

cient. Always allow at least 24 hours for undercoats to dry, then sand with fine sandpaper.

If the enamel finish is to be other than white, the undercoat and enamel may be tinted with colors ground in oil. After the enamel has dried three days, it may be rubbed with pumice and oil. If two coats of enamel are necessary, the first coat must be sanded before the second coat is applied, because enamel will not "take" on a glossy surface and the sanding gives just the proper texture to which the succeeding coat can bind.

There are flat drying enamels on the market, but they are not so durable as the gloss enamel. They save time, however, and the expense of rubbing, and are often used on all but very high-grade work.

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